The Electrical Industry's Weekly Magazine November 20, 1961

Electrical World

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How Hartford Improved Street Lighting When Survey Showed the Need

... page 60

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Electrical World

NOVEMBER 20, 1961
Vol. 156, No. 21

Dateline . . .

New Frontier Power Policy – In Perspective I

Washington, D.C.—President Kennedy's "New Frontier" moved into Washington this year on the heels of the closest election race in history. But the new Administration's pronouncements on power—many couched in generalities—came thick and fast, as if there had been a clear mandate from the voters.

These policies pretty much reflected the earlier, liberal power philosophies of the Democratic platform and campaign. Public power supporters of the new President were tense with anticipation; power companies braced themselves for renewed federal encroachment into their field.

In retrospect, it's obvious that much of the early expectation of quick action on these power policies simply had fed upon itself. Too little attention was given to the election results and the generally conservative shift in Congress.

Kennedy—who had been involved in a strenuous campaign, and quickly became enmeshed in serious international crises—left power policies pretty much to the party's power advisers, a strongly federal power group. Several federal power advocates were placed in high administration posts, and in fact, President Kennedy urged them to "think big" on power programs. This suggestion led many to believe that he would back any or all power proposals.

A number of influential public power leaders used the early days to emphasize the federal power platform on which President Kennedy had run. Some spoke in dual roles as party advisers, and thus, had the possible authority of quasi-administration spokesmen. The result was to keep the new Administration thinking in terms of broader power responsibilities.

The White House actually used this public power "bandwagon" approach to its own advantage: to buy time while it could determine definite steps it would take on power policies. Also, the "bandwagon" was used as a sounding board and a first line of defense—giving time to fall back to an entrenched position if necessary—while testing the political climate.

It should be recalled here that the Democratic platform had called for: separation of the US budget into a capital budget and operating funds, a White House Council of Resource Advisers, and wholesale

(*Continued on page 5*)

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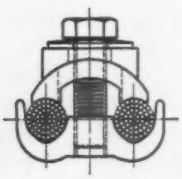

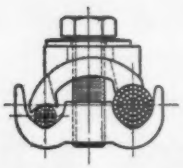

The TRIPLEX (type TRV) incorporates several unique features, that attribute to its high strength and extremely stable electrical characteristics.

1. A tangential plate, that receives the bolt clamping pressure and redistributes it uniformly over the arc of the clamping cap.

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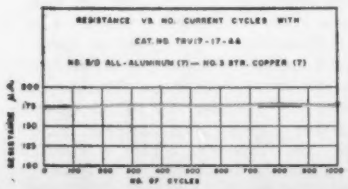
3. To assure full clamping pressure during the thermal change caused by varying electrical loads, the connector has dish-shaped Belleville spring washers under the head of each bolt that permit expansion or contraction of the connector with constant spring loaded pressure on the clamping members.



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An established current level of 330 amperes drove the conductors to a minimum temperature of 125°C. The on-time was 20 minutes and the off-time 40 minutes. The curve shows negligible resistance change throughout the entire 1000 cycles.

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Dateline . . .

Washington, D. C. (*Continued from page* 3)
power systems independent of power distributors. The "Kennedy-Johnson" resources report, after the election, called for an immediate end to the Budget Bureau's circular A-47 on feasibility standards, mine-mouth generating plants in the Appalachian plateau, federal, regional interties.

And President Kennedy, in his February message on natural resources, called for: early federal interconnections, cooperative pooling, a natural resources advisory unit under the Council of Economic Advisers, a quick re-evaluation of A-47 by the Budget Bureau.

The President also asked Interior Secretary Stewart Udall to review the International Joint Commission's finding against feasibility of the Passamaquoddy Tidal Power Project. The firm decision was made to go ahead on the Hanford power plant.

What happened to these plans? Probably the heavy Democratic Congressional majorities were misjudged as guaranteeing support of all such programs. Anyway, the high-stepping Kennedy power program began to slow down on the muddy track of a grimly-political Congress.

President Kennedy also started to pull in the reins on some of these power proposals, as he and his advisers had time to settle down on the precise course the Administration would follow.

Federal mine-mouth steam plants were set-aside, and the White House Resources Council withered before an alternate plan to strengthen the Budget Bureau. Kennedy reiterated his position for a 'Quoddy' re-study and called for "common carrier" lines, more power pooling, and federal interconnections; but he left most of these battles to subordinates, freeing himself for world problems.

His men in key power posts were left to carry out the Administration's power programs without as much White House support as they might have wished.

Letters

Even Larger Than 'Gigantic'

To the Editor:

In discussing the plans of Duke Power Co to build a "gigantic" steam plant on the Savannah River, *Electrical World* (Sept. 11, p 38) states that its eventual 2,000-Mw capacity will be "larger than any existing or planned."

On page 48, same issue, an article about TVA's new Paradise Steam Plant includes the statement that "Two 650-Mw cross-compound units, the largest today, will be installed in the Tennessee Valley Authority's Paradise Steam Plant" and "Plans call for two later units of equal or larger size."

L. B. Marks
Power Reports and Information
Management Services Staff
Tennessee Valley Authority

▶ It was quite a week for superlatives.

Now, About That River Crossing

To the Editor:

This refers to an article appearing in the July 31 issue of *Electrical World* describing the Hudson River crossing of the Consolidated Edison-Orange & Rockland line as the longest span in the East. C. H. Shofer in his letter to the Editor published in the Sept. 11 issue pointed out a longer span constructed by Pennsylvania Power & Light Co over the Susquehanna River.

Just to keep the record straight, may I call your attention to two spans across the Little Tennessee River between North Carolina and Tennessee belonging to Tapoco, Inc, (formerly Knoxville Power Co) a wholly owned subsidiary of the Aluminum Co of America.

While this span is shorter than the Susquehanna crossing it is considerably longer than the Hudson River crossing. The first span, placed in service in March 1919, is 5,010 ft between towers. The conductors are 500 MCM ACSR. For many years this was the longest span in the world. It has been described in several articles, but probably more fully in the Journal of the AIEE, June 1920. The span of the second circuit, installed in 1927, is 5,084 ft long.

Mead Warren
Tapoco, Inc
Alcoa, Tenn

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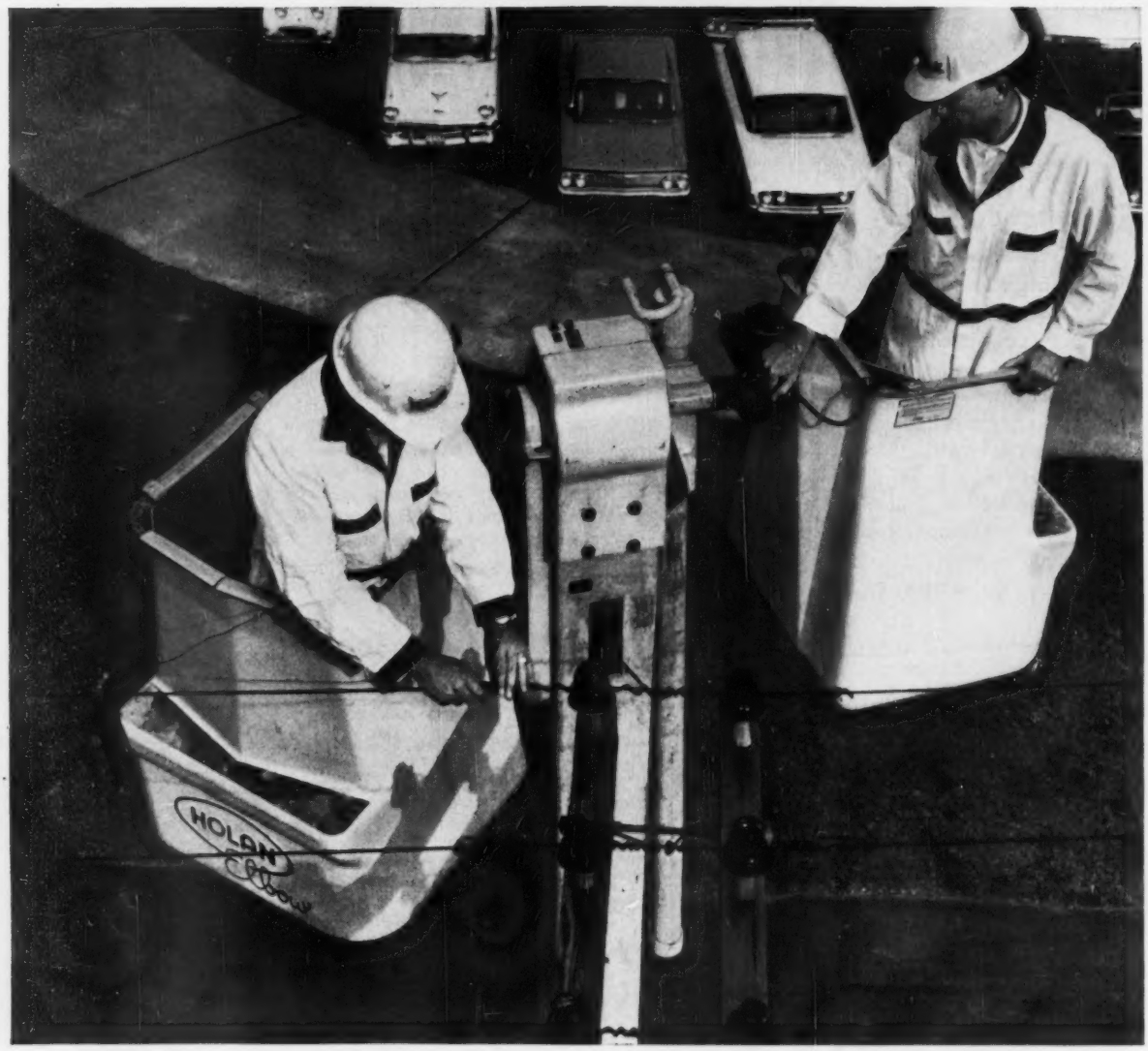

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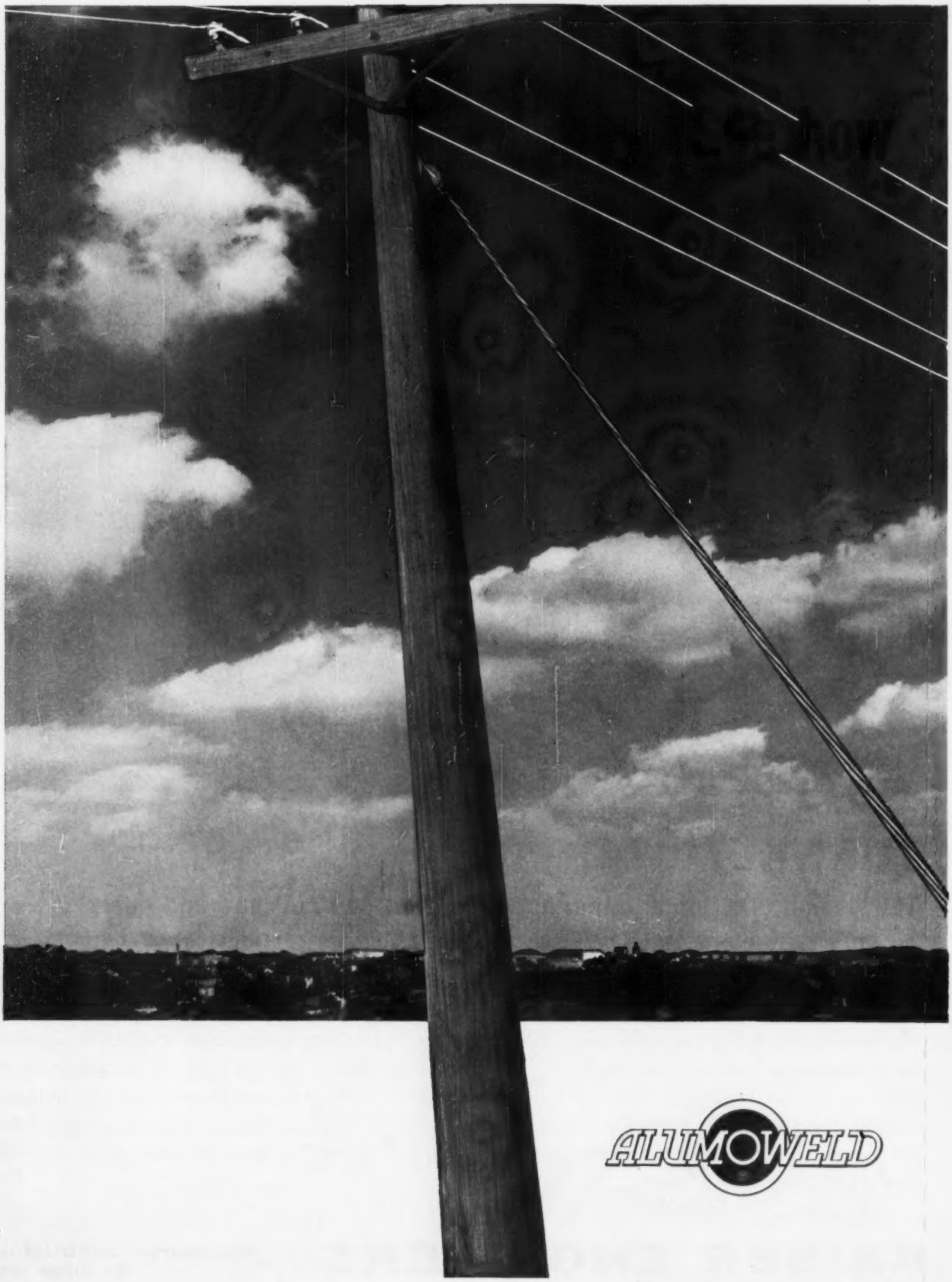

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can fill your requirements for guying installations...

ALUMOWELD, made by the controlled atomic-welding process, combines aluminum and steel to give you strand with *permanent* high strength. The following facts tell you why Alumoweld should be your choice for guying installations.

STRENGTH—Alumoweld has a higher strength-to-weight ratio than any other strand used on overhead lines. Size for size, Alumoweld has the same tensile strength as extra-high-strength steel . . . weighs 18% less . . . and will last far longer.

CORROSION RESISTANCE—a *thick* cladding of pure aluminum—25% by area—gives Alumoweld the same long life and high resistance to corrosion as solid aluminum.

EASIER TO INSTALL—Because of its lighter weight, Alumoweld is easier to handle so installation is faster. Dead-end fittings and other accessories are available from suppliers.

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Supplies of Alumoweld Strand are available for prompt shipment from our warehouses in New York, Chicago, Pittsburgh and Memphis.

For the complete story on Alumoweld, write for Engineering Bulletin E. D. 3000.

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thick cladding of aluminum
strong steel core
controlled atomic weld

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Ordinary filter systems serve adequately until something really goes wrong. Then, only a centrifuge can restore turbine oil to proper dryness and cleanliness. Why not put centrifugal purification directly into your routine by-pass system on a full time basis and be prepared for all types of emergencies at *any* time?

The "UNI-MATIC" is a complete oil purification unit including all necessary pumps, heaters and control equipment. It continuously removes water and solids and is so efficient and dependable that even after water leaks are discovered, turbines have been left in operation until shut-down is convenient.

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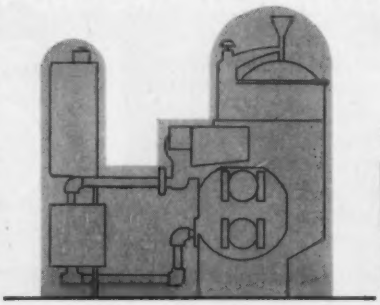

MORE ECONOMICAL TO INSTALL AND OPERATE: The De Laval UNI-MATIC or PURI-FILTER systems eliminate the need for a stand-by centrifuge, and are much more compact than all-filter purifiers. Full details on the low-maintenance features of typical installations are given in descriptive literature which will be sent at your request.

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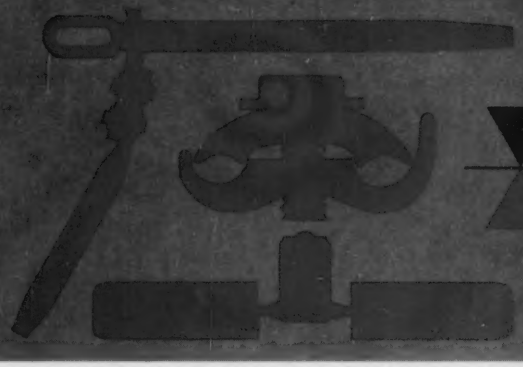

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Announcing ALNOX

. . . a new joint compound designed with the connection in mind

ALNOX has exceptional electrical qualities. It protects the good joint it helps make by excluding moisture. Even in pelting rain it adheres and does not wash away. ALNOX is Alcoa's *newest* electrical joint compound.

ALNOX is a compound containing extremely hard, conductive particles. It has the optimum combination of electrical characteristics and corrosion resistance. It does a superb job over a full range of temperatures.

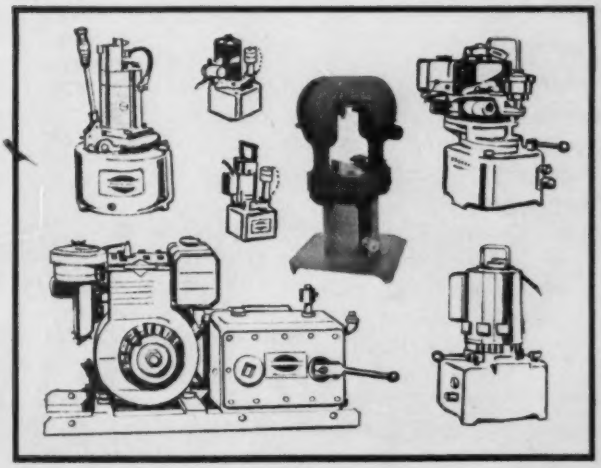
ALNOX's melting point is above 550°F—won't melt or run during high-temperature operating conditions. Under conditions of extreme cold, it remains pliable for easy installation.

ALNOX is available now, packaged in an easy-to-use plastic squeeze tube—especially designed for the convenience of the lineman.

Why 10,000 psi?

Every pump pictured here is capable of delivering 10,000 psi. That's why we have standardized on this pressure for *all* of our compressors. It means you can use any of the pumps shown, as well as many not included in this picture. It means that the same pumps used for conduit benders and punches can be used with Alcoa compressors. It means complete interchangeability for hose and fittings.

It adds up to this: Use 10,000 psi for *versatility* and *interchangeability* of your equipment. Another good reason for standardizing on Alcoa when it comes to accessories and equipment!



(Continued on next page)

Alcoa service entrance connectors now available in 5/8" size

CONDUCTOR SIZE						Wt. in Lbs. Per 100 Pieces	Cat. No.
"B" END			"C" END				
ACSR	AWG	Color Code	ACSR	AWG	Color Code		
1/0-6/1	1/0 Str.	Yellow	1/0-6/1	1/0 Str.	Yellow	4.9	1367
			2-7/1 2-6/1	2 Str.	Red	4.9	1366
			4-7/1 4-6/1	4 Str. 2 Sol.	Orange	5.0	1365
			6-6/1	6 Str. 4 Sol.	Blue	5.2	1364
2-7/1 2-6/1	2 Str.	Red	2-7/1 2-6/1	2 Str.	Red	4.9	1362
			4-7/1 4-6/1	4 Str. 2 Sol.	Orange	5.0	1361
			6-6/1	6 Str. 4 Sol.	Blue	5.3	1360
4-7/1 4-6/1	4 Str. 2 Sol.	Orange	4-7/1 4-6/1	4 Str. 2 Sol.	Orange	5.2	1357
			6-6/1	6 Str. 4 Sol.	Blue	5.4	1356

The picture and the table tell the story. These service entrance connectors have the features utilities requested. Easy-to-puncture aluminum end caps are color coded. Barrels contain ALNOX, the joint compound that won't melt even at 550°F. Each connector is clearly marked for quick identification. The new 5/8" Alcoa® Service Entrance Connectors are packed 50 to the box. These connectors are sold by Rome Cable Div. of Alcoa.

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Alcoa contributed extensively to General Electric Company's Project EHV at Pittsfield, Mass., in supplying structures, conductors, and accessories. The latter included two types of bundled conductor spacers, one of which is shown in the photograph. Design of these spacers involved special consideration to avert interference with radio and television reception.

When it comes to accessories for EHV, the most experienced source is Alcoa . . . by far.

Research at Alcoa

A technician at Alcoa's research facility in Massena, N. Y., attaches the driving motor to the conductor for a vibration-fatigue test.

Conductors, bundling, dead-ending, connections, joint compounds, vibration dampers: Alcoa has studied them all from the time aluminum conductors were first used. We regularly provide customers with engineering data and recommendations based on our findings. Direct your inquiries to your local Rome Division salesman.

Summing up:

Neither moisture nor extremes in temperature have adverse effects on Alcoa's new electrical joint compound, ALNOX—available now in easy-to-use plastic tubes.

Because 10,000 psi is standard pressure for all Alcoa compressors, you get maximum versatility and interchangeability from your pumps.

EHV—we're ready when you're ready with the most complete line of accessory items available to utilities today.

New 5/8-inch service entrance connectors are designed for quick, easy, efficient handling and installation.

Your nearby Alcoa-Rome representative is eager to supply full details on any or all of these items. Why not call him today?

ALCOA
ROME CABLE
DIVISION

Electrical World

NOVEMBER 20, 1961
Vol. 156, No. 21

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DATA LOGGING, scanning, alarming, and calculating in power plants and substations is the subject of a special report.

LATE NEWS ▶ **British Columbia Power Corp asks British Columbia Supreme Court** to rule that the province had no legal power to expropriate British Columbia Electric Co. B. C. Power also asks that if the court rules the expropriation to be legal, it set a price as "full compensation" for the action.

Tennessee Valley Authority Chairman Herbert D. Vogel says he will not accept reappointment as a TVA director when his nine-year term expires in 1963.

NEMA names new presidents at 35th annual meeting in New York: Homer L. Travis, vice president in charge of sales for American Motors Corp's Kelvinator div.

Large segment of El Paso, Texas, is blacked out for several hours as severe blizzard hits city. High winds knock down a number of lines, including 69-kv line from Rio Grande power plant. Three small New Mexico towns also without power.

Federal judge in Philadelphia rules that Federal Trade Commission cannot have access to grand jury testimony leading to manufacturers' antitrust cases. FTC wants to see if manufacturers violated 1938 FTC cease and desist orders on price fixing (EW, Aug. 7, p 14).

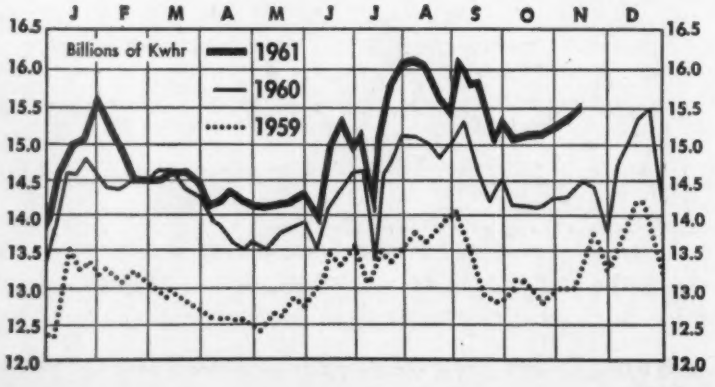
Tax exemption of rural electric co-ops doesn't extend to their jointly owned finance companies, US Tax Court rules. The court upholds an Internal Revenue Service ruling that profits of a Kentucky corporation, formed to finance members' purchases of home appliances, are not exempt from federal tax laws.

Two companies announce advances in thermoelectricity. Radio Corp of America says it is using alloy materials in laboratory to achieve "15% efficiency." General Instrument Corp announces invention of "semi-metal" to bond together dissimilar metals, thus allowing assembly-line production of thermoelectric units.

Interior Secretary Stewart Udall's special task force studying the proposed intertie between Bonneville Power Administration and California is expected to make its final report Dec. 15, a delay from the Nov. 1 deadline set earlier. Factors delaying the report include the question of Canadian storage, possible legislation to "protect" Northwest customers, and possible interconnection of the line into the Bureau of Reclamation's Colorado River projects.

FPC is asked to review and recommend possible hydro sites for a new report on the Potomac River, now being prepared by the Corps of Engineers.

WEEKLY POWER OUTPUT—Up 7.0% (Week ending Nov. 11), Kwhr 15,520,000,000



Percent Change From Previous Year

	Oct. 28	Nov. 4	Nov. 11
Total U. S.	+ 7.0	+ 7.1	+ 7.0
New Eng.	+ 9.1	+ 7.8	+10.5
Mid. Atlan.	+ 5.7	+ 7.1	+ 7.9
Cent. Indust	+ 6.9	+ 5.7	+ 5.3
West Cent.	+ 7.1	+ 7.1	+ 6.9
Southeast	+ 2.8	+ 3.1	+ 3.4
South Cent.	+ 8.5	+14.5	+ 8.2
Rocky Mount.	+14.9	+13.3	+13.2
Pacific NW	+11.1	+ 8.3	+ 8.8
Pacific SW	+10.9	+11.2	+13.6

Seasonally Adjusted Index 300

Week Ago 299 Year Ago 281

Source: Edison Electric Institute

Supply Lines

FOUR UTILITIES OBJECT TO CONSENT DECREE PROVISIONS

Four major electric utilities have asked to be heard in antitrust action on proposed consent decrees, claiming that the Justice Department's clause enjoining sales at unreasonably low prices would deprive them of the benefits of free price competition in the purchase of electrical equipment.

In a letter to antitrust chief Lee Loevinger, Milton Handler, attorney for the utilities—Pennsylvania Power & Light, Cleveland Electric Illuminating, Long Island Lighting and American Electric Power—said that inclusion of such a provision "will tend to perpetuate the anticompetitive effects of the very conspiracies whose termination is the objective of the Philadelphia cases. The net effect of the proposed judgments may well be higher prices to utilities for the electrical equipment which they must buy from these defendants."

Handler stated that his clients had strong reason to believe that the electrical manufacturers will take the position that all the prices charged during the conspiracies were reasonable in view of the improvement in equipment and price movements in other areas. From that point, said Handler, it is but a short step to the position that lower prices would be "unreasonably low" within the meaning of the consent judgments.

GAO DECISION ON 'BUY AMERICAN' DISPUTE EXPECTED SOON

A decision by the General Accounting Office on the "Buy American" dispute between Allis-Chalmers and Baldwin-Lima-Hamilton will probably come this week. It's expected to be long, and it should cover many of the points raised by the various parties.

All evidence has been taken on the issues Allis-Chalmers had requested the GAO to rule on: (1) that the Baldwin-Lima-Hamilton bid is incorrect and not responsive to the Corps of Engineers invitation for bids on turbines for John Day and Lower Monumental dams; (2) that an award to B-L-H which would involve partial Japanese work would be against the grain of national security; and (3) that the 50% factor in the Executive Order, by which B-L-H claims it is a domestic bidder, is against the original intent of the Buy American Act and therefore illegal in itself.

Since the bids were received, York, Pennsylvania, where Allis-Chalmers would build turbines, has been taken off the depressed areas list, and it is not known whether this would affect evaluation of A-C's bid. This would only be considered if Baldwin-Lima-Hamilton were disqualified.

ATTORNEY GENERAL WON'T LET UP ON ANTITRUST ENFORCEMENT

Attorney General Robert F. Kennedy equates price fixing with racketeering, and believes guilty individuals deserve "as severe punishment as the courts deem appropriate." He told the Economic Club of New York last week that he opposes immunity for individuals involved in price fixing and bid rigging frauds. Fines for their companies aren't enough, he said, but "those responsible should be held responsible."

Following up a recent press conference comment of his brother, President Kennedy, the Attorney General indicated that his department will not go easy on enforcement

of the antitrust laws merely to slough off the "anti-business" tag that has been hung on the Kennedy Administration. Robert Kennedy sought to convince the businessmen that the "anti-business" charge against the Administration is false. But he proffered no letup in antitrust enforcement, and defended antitrust activity as pro-business rather than anti-business.

"I believe firmly that the purpose of the antitrust laws is to protect and promote the competitive interests of business—small and large—as well as to protect the public," he said. Between May and September, he noted, nearly 300 of 439 antitrust complaints received have come from businessmen.

"The list demonstrates that there is probably no area of the business community which at one time or another has not sought the Department's assistance," Kennedy said. He regretted that those who have sought the protection of the Justice Department haven't been more "articulate" in defending its activities.

Kennedy conceded that there can be confusion about the application of some antitrust provisions, where honest differences over the laws and economics are involved. Where these differences arise, as in merger cases, Kennedy pointed out that his department is willing to discuss problems and advise individual companies of its positions.

GE, WESTINGHOUSE PRESIDENTS TAKE A LOOK AT PROFITS

"We're cautiously optimistic," said General Electric Co president G. L. Phillippe when queried on the company's profit expectations in 1962. The bottom of the business slowdown has passed and "we'll be in an ascending curve rather than a descending one," Phillippe predicted. He declined comment on the trend of sales and earnings for the fourth quarter but noted a 3% increase in sales in the third quarter from the like period a year earlier.

Mark W. Cresap, Westinghouse president, called his company's nine-month profit performance "disturbing" and called for employees to work harder to control costs and improve sales. "We are pleased that new orders for some of our product lines have been showing some gains in recent weeks, but over-all we haven't done as well as we figured we would," Cresap noted.

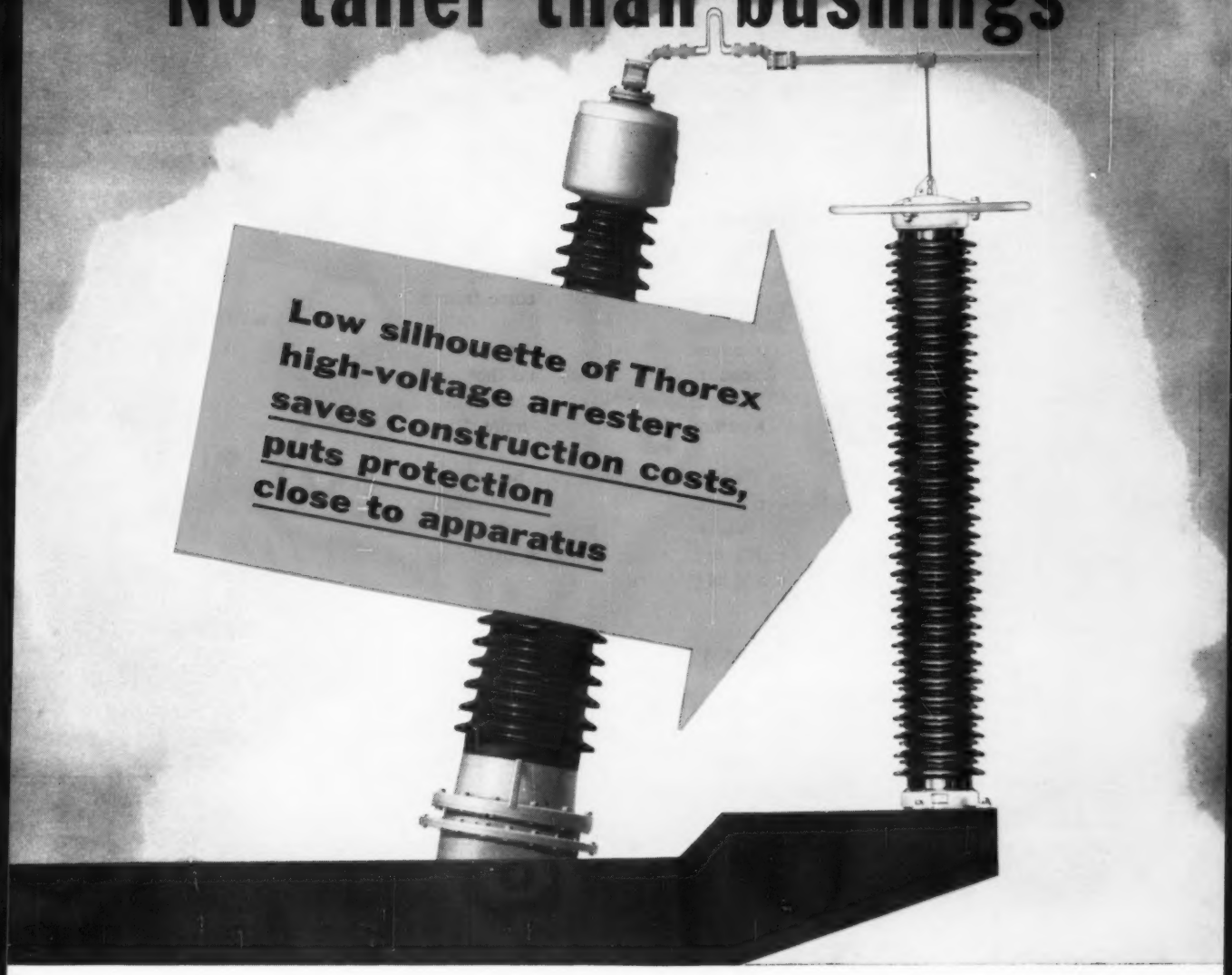
ARIZONA PUBLIC SERVICE FILES ANTITRUST SUIT

Arizona Public Service Co filed a $26-million antitrust suit in Phoenix federal court Nov. 8 against Westinghouse Electric Corp, Allis-Chalmers Mfg Co, and General Electric Co. APS charged that it was required to pay $8.8 million more than the fair competitive price for generating units and seeks triple damages. The company plans to file additional suits against various manufacturers.

GENERAL ELECTRIC PUBLISHES INDUSTRIAL SYSTEM PRICES

General Electric published prices on basic standard systems for industrial process machinery in the paper, metal rolling, printing, rubber, mining and cement industries. System prices published take into account not only individual components, but also clearly identified engineering and service contributions so that customers can make a dollar evaluation of differences between systems.

No taller than bushings



You can mount *all* Thorex Station Class lightning arresters, including 345-kv, right on station apparatus - - the same way you mount lower voltage arresters. They will be no taller than the transformer bushings!

You save valuable yard space that would be required for special and individual arrester mounting structures. A Thorex Station Class arrester can be located practically any place that will accommodate an ordinary insulator stack. Cap suspend it or base mount it.

For transformer mounting, you can support the Thorex arrester by an ordinary pedestal close to the apparatus terminal. Weight and size of Thorex are real advantages . . . only 1050 pounds and 9½ feet for a *complete 345-kv* lightning arrester!

Closer proximity of the arrester to the apparatus terminal, together with lowest discharge voltage assures best protection available. Only a few inches separate the apparatus terminal from the Thorex Station Class lightning arrester.

This small size and light weight can easily pay for the arrester with savings in installation. If you are planning high voltage station construction, include the world's smallest, yet most effective arresters - - Thorex.

OHIO BRASS COMPANY, MANSFIELD, OHIO

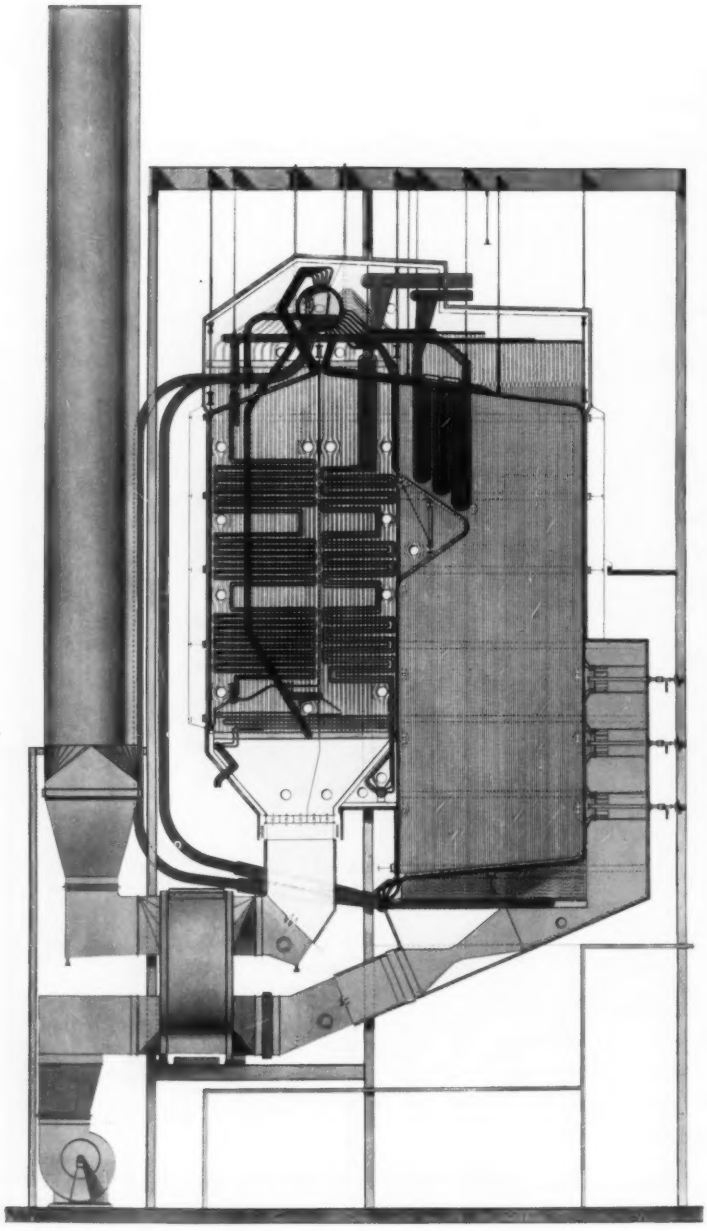
Ohio Brass HOLAN

PORCELAIN INSULATORS • LINE HARDWARE • CAPACITORS • LIGHTNING ARRESTERS
BUSHINGS • HOLAN TRUCK-MOUNTED POWER DEVICES AND BODIES • BRONZE VALVES

10107-H

Another FIRST for RILEY—

1,020,000 lbs/hr RILEY Boiler For Kansas Gas & Electric's New



The new Gordan Evans Plant of Kansas Gas & Electric Company is to be the largest power plant in the state of Kansas when the fourth boiler is finally installed. The first unit is the largest generating unit in Kansas and will produce 160,000 kw and brings the system's total to 778,000 kw. A Monitor and Results Computer System (MARC) is the first to be installed by KG & E and one of only four of its type in the nation.

The Riley Boiler is fired by natural gas and oil as standby and is designed for future pulverized coal. The boiler is pressurized and encased in peach colored porcelainized steel. The design is typical of Riley front wall fired units with Riley Flare Type Burners. Superheat is controlled by dampers with spray overide. Dampers also located below the economizer control reheat steam. Performance of the boiler has been satisfactory since start-up. Kansas Gas & Electric is one of the many electrical utilities that recognize Riley's abilities to design and manufacture steam generating equipment capable of meeting present day requirements.

Any of the below located offices will be glad to furnish full details regarding Riley's ability to be of service to you.

Operating Data

Unit No. 1 — Gordon Evans Plant

Capacity — 1,020,000 lbs/hr

Operating Pressure — 1800 psig

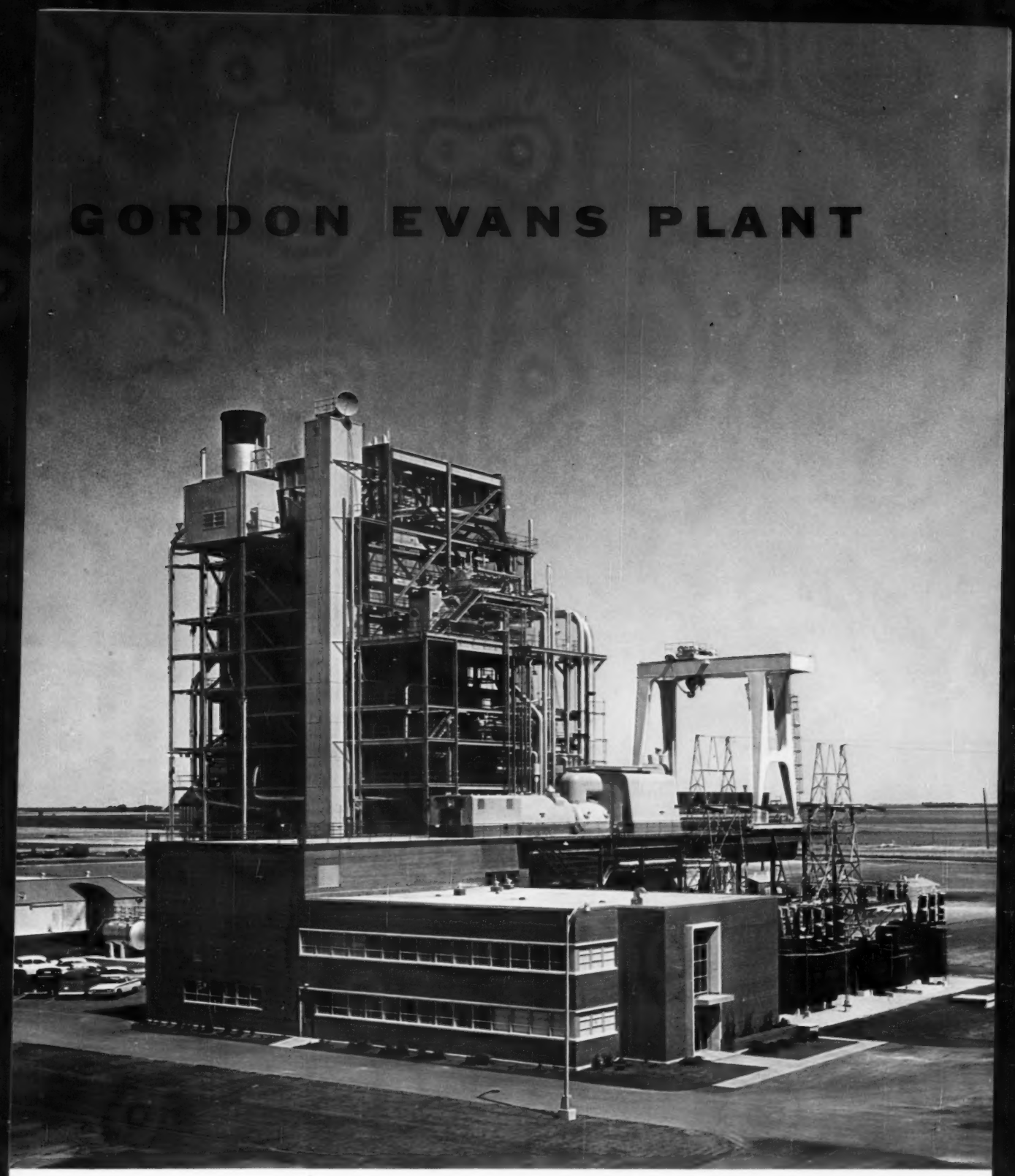
Superheat/Reheat — 1005/1005 F

Full Load Operating Efficiency on Gas — 84.4%

Ebasco Services, Inc.
Consulting Engineers

RILEY STOKER CORPORATION • WORCESTER, MASSACHUSETTS

SALES OFFICES: Boston, Charlotte, Chicago, Cincinnati, Cleveland, Denver, Detroit, Honolulu, Houston, Jacksonville, Kansas City, Los Angeles, New Orleans, New York, Philadelphia, Pittsburgh, Portland, Salt Lake City, San Francisco, St. Louis, St. Paul, Seattle, Syracuse.



A careful survey of your plant by a qualified consulting engineer could show ways of making substantial savings in power costs.

RILEY

STEAM GENERATING AND FUEL BURNING EQUIPMENT

WEATHER *saps the life from ordinary rubber—but not DuPont neoprene*

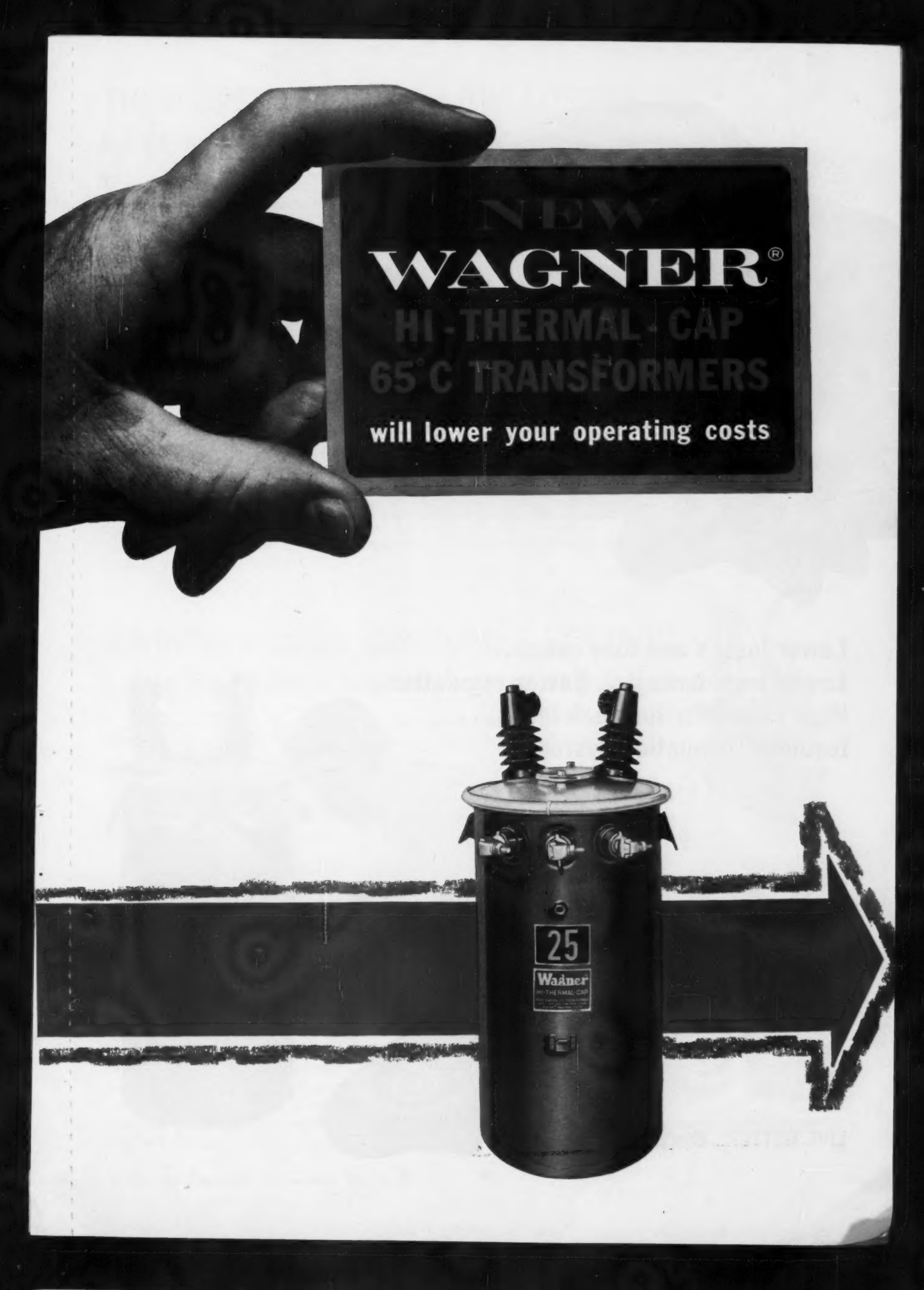
These two outdoor test samples of cable have been constantly exposed to sun, rain, snow, ozone and industrial fumes—for over 25 years. The ravages of weather show clearly in the ordinary rubber jacket . . . badly cracked and embrittled. But the neoprene jacket is virtually as good as the day it was made . . . still smooth surfaced, tough and resilient.

In addition to this time-proven weather resistance, neoprene offers you many more protective qualities. Neoprene jacketing is flame resistant, oil resistant, impact and abrasion resistant. It can withstand line overloads without "flow," resists permanent deformation under load, and remains flexible down to −65° F. In short, neoprene has the best combination of properties available in a jacketing material. For more information write E. I. du Pont de Nemours & Co. (Inc.), Elastomer Chemicals Dept. EW-11, Wilmington 98, Delaware.

DU PONT
REG. U.S. PAT. OFF.

NEOPRENE
SYNTHETIC RUBBER

Better Things for Better Living . . . *through Chemistry*


NEW
WAGNER®
HI-THERMAL-CAP
65°C TRANSFORMERS
will lower your operating costs
25
Wagner
HI-THERMAL-CAP

Lower losses and loss ratios...
Lower impedances... Better regulation...
High capability for peak loads...
Insuldur® insulation systems

LIVE BETTER...*Electrically*

THEY OPERATE WITH LOW LOSSES

L_2FPL means lower losses for peak loads

This also means more economical operation at all loads. Core losses are low, copper losses have been reduced, resulting in lower total losses and lower ratios of approximately 2.5 to 1. This provides savings in cost of losses under normal loading conditions, and on overloads. Since the cost of losses greatly affects operating expense, the lower total losses add up to lower operating costs.

These new Wagner® Transformers will help you meet tomorrow's loads and their requirements reliably and economically.

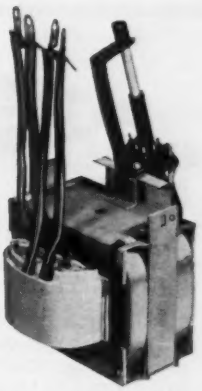
HANDLE PEAK LOADS WITH EASE

INSULDUR® Insulation System allows high thermal loading with 65°C rise transformers

The high thermal capabilities of Wagner HI-THERMAL-CAP 65°C Transformers result from the use of Insuldur layer insulation and high temperature epoxy coated conductors. The remarkable thermal-aging characteristics of Insuldur cuts insulation failure due to heat in half. Insulation retains full dielectric strength and binding qualities at 65°C operation.

MAINTAIN GOOD CUSTOMER VOLTAGE

Lower impedances improve voltage regulation

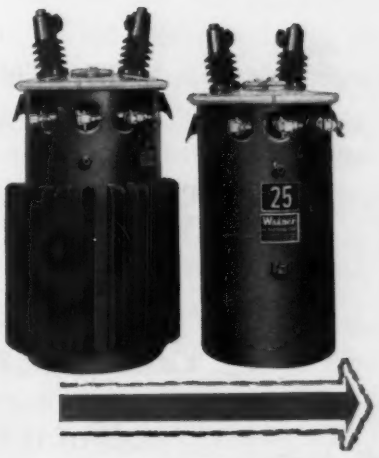


Impedances for ratings 100 Kva and below are 2% or less. You get minimum voltage drops even under high overloads—regulation problems are minimized.

Coils are wound with thermosetting resin on the layer insulation which bonds the coils together. The new endplate design gives positive bracing. This assures high short circuit strength of at least 40 times full-load current.

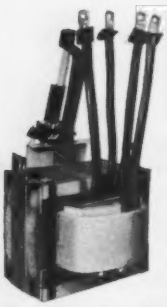
ARE SMALLER AND LIGHTER

Allow you to increase capacity without additional investment in new poles



The new Wagner HI-THERMAL-CAP 65°C, 25 Kva, 7200 volt Transformers are lighter and smaller—2½" shorter than their 55°C counterparts, yet use approximately the same amount of oil. They are easier to store and handle —take less space on poles. For example, a 55° 100 Kva transformer can be replaced with a 65° 167 Kva transformer.

WITH ALL THE FEATURES YOU WANT



SIMPLIFIED ENDPLATE DESIGN

The new endplate assembly provides rigid construction for greater mechanical strength. Virtually all nuts, bolts, screws, individual coil clamp blocks, springs, thimbles, angle irons and brackets are eliminated. The assembly is smaller in size—lighter in weight.

PLASTIC-COATED COVER

A porcelain-like coating gives improved corrosion resistance to covers, protects from line to ground, insulates small animals from the grounded cover to prevent outages. Coating is applied to covers, to the Shur-Seal clamping ring, and to cover bolts.

NEW LV BUSHING ASSEMBLY

The re-designed LV bushings for transformers through 167 Kva provide better gasketing. Terminals are larger to accommodate aluminum conductor. Special lock washers provide better clamping for conductors.

HV BUSHING DESIGNED FOR SAFE INSTALLATION

Heavy wet-process porcelain HV bushings, with undercut petticoats, have insulated knob for hand tightening of terminals. All 2400 v and 4800 v transformers have HV bushings arranged to facilitate application of arresters.

Plus... **HIGH TEMPERATURE INSULATING OIL — LONG-LASTING SURE-SEAL PAINT — ROLLED UNDER BASE DESIGN**

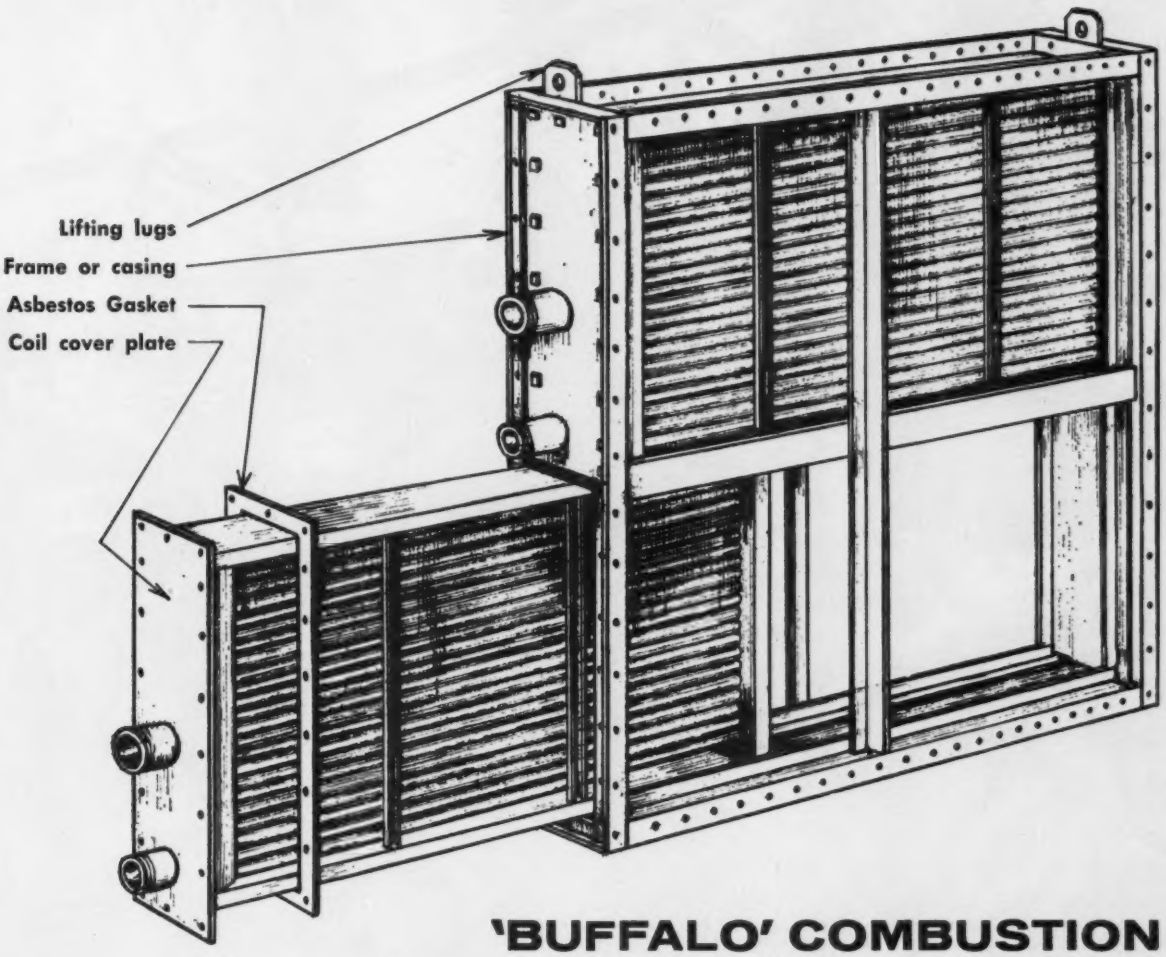
For additional information on this new dollar-saving line of Wagner® HI-THERMAL-CAP 65° C Transformers, ask your near-by Wagner Sales Engineer, or write us.

Wagner Electric Corporation

6456 PLYMOUTH AVENUE, ST. LOUIS 33, MO., U.S.A.

Manufacturers of LOCKHEED® Products

WT61-18



'BUFFALO' COMBUSTION AIR HEATER PACKAGES

cost less to install and maintain!

Expensive on-the-job fabrication of coil casing and frame is eliminated when you use factory assembled 'Buffalo' combustion air heater packages. Aerofin heavy-duty steam or hot water heating coils of tapered fin design give maximum heat transfer and low air-side static loss. Heater casing of heavy structural steel prevents binding when coils are removed and inserted. The removable core cover plate, with gasket, is bolted to the casing or frame to provide a gas-tight fit at high static pressures. For low cost, easy maintenance combustion air heaters, contact your resident Buffalo Representative or write for Bulletin FD 800.

AIR HANDLING DIVISION

BUFFALO FORGE COMPANY

Buffalo, New York

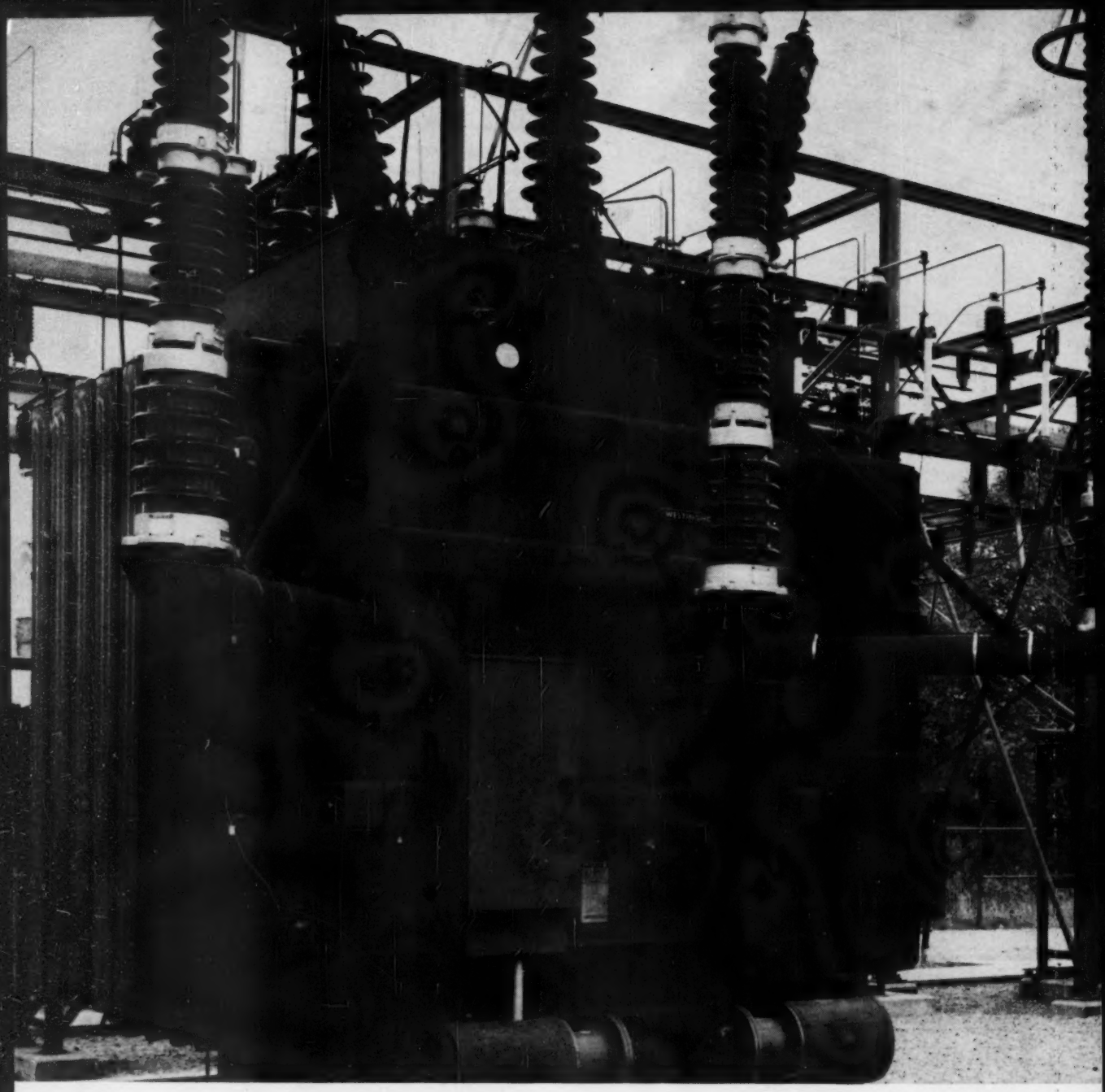
Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

'Buffalo' Air Handling Equipment to move, heat, cool, dehumidify and clean air and other gases.

'Buffalo' Machine Tools to drill, punch, shear, bend, slit, notch and cope for production or plant maintenance.

'Buffalo' Centrifugal Pumps to handle most liquids and slurries under a variety of conditions.

Squier Machinery to process sugar cane, coffee and rice. Special processing machinery for chemicals.



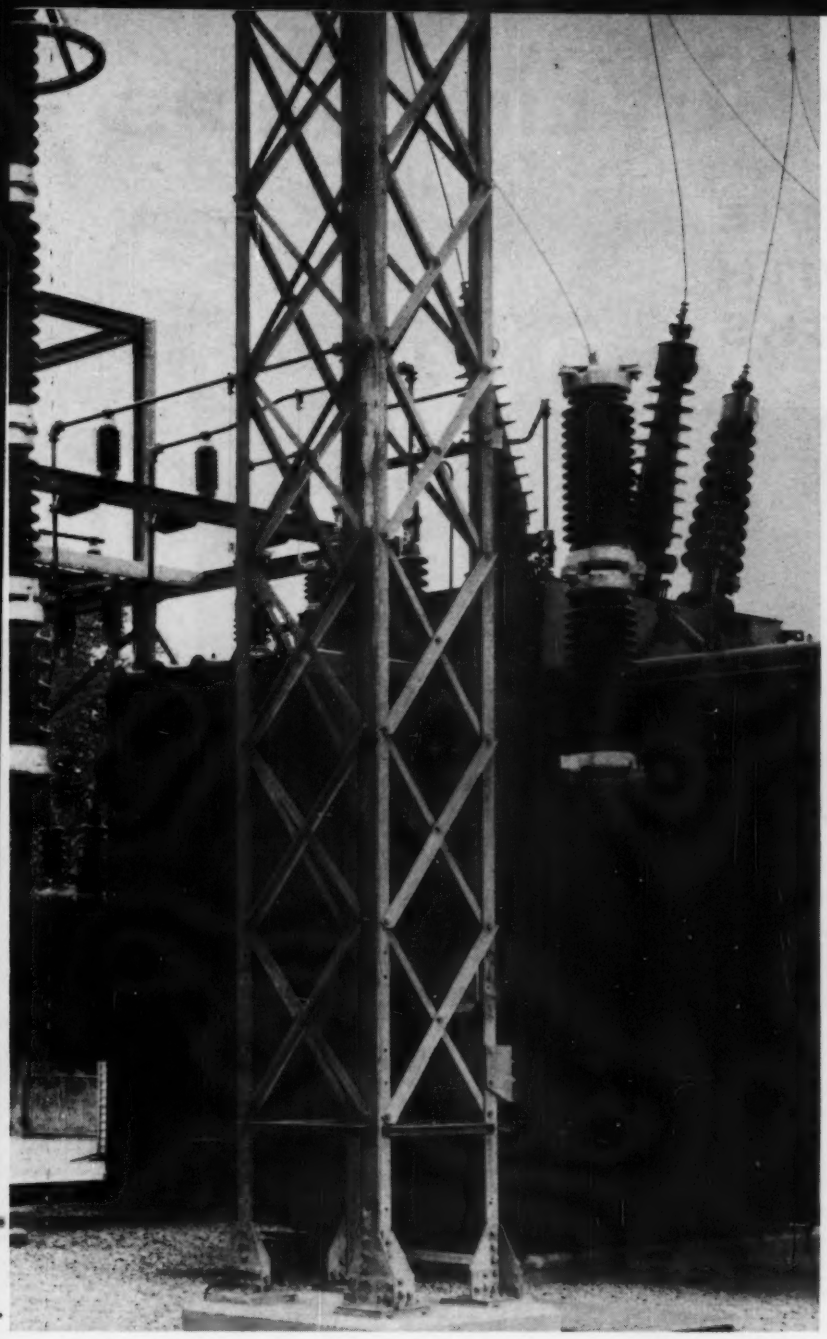
Now available from Gulf: A superior

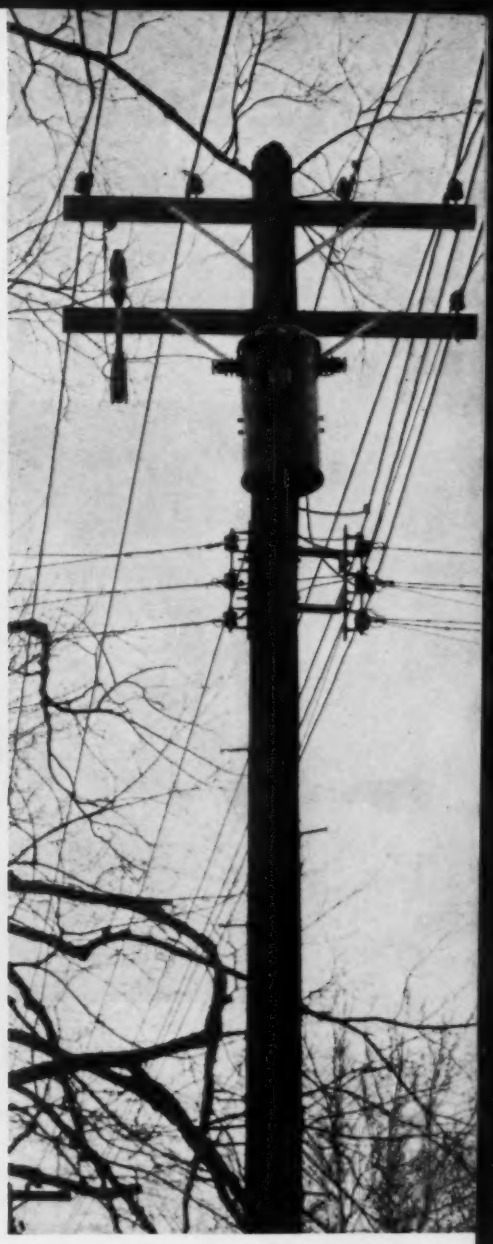
New Gulf Transcrest fully meets *all* the requirements and specifications of *all* transformer manufacturers including: stability, heat resistance, insulating ability and high flash point.

This outstanding oil is formulated to handle increased operating temperatures so that transformer manufacturers can make smaller units for given service applications.

Gulf Transcrest is made from a selected crude oil recognized for its electrical insulating properties. It is acid-treated and clay filtered (acknowledged as the best refining treatment for insulating oils). As a result Transcrest has excellent electrical characteristics (see table at right).

Remember, Gulf Transcrest meets the requirements of all transformer manufacturers. Try it and prove to yourself that Gulf makes things run better! For information, call a Gulf Sales Engineer at your nearby Gulf office, or write to Gulf Oil Corporation, Dept. DM, Gulf Building, Houston 2, Texas.





Transcrest's excellent electrical characteristics and outstanding stability provide trouble-free service for large or small units.

transformer oil . . . Transcrest

Power Factor, 60 cycles: %	77°F	0.02
	212°F	0.06
Resistivity, ASTM D 1169: Ohm-CM x 10^{12}		
	77°F	1390
	212°F	80
Dielectric Strength:	Kv	34

GULF

GULF MAKES THINGS RUN BETTER!

CRESCENT HOT LINE GRIPS

FOR SAFE, REMOTE OPERATION WITH HOT LINE STICKS

▶ These grips are an adaptation of the standard Crescent Grip which has earned a reputation with line crews everywhere for being jamproof, slip-proof and instantly releasing.

Operation is simple for linemen familiar with the use of hot line sticks. Grip is held open by engaging notch "B" in bottom of frame loop. Grip is then placed on wire by means of eye "A". Latch "C" is swung into place with hot line stick. Jaws are closed when engagement of notch "B" is tripped by upward movement of the pulling eye arm. Grip is released by placing hot line hook on rivet stud "D" and pulling until notch "B" engages frame loop.

Made in three sizes; each grip tested to its safe load capacity. Cadmium plated.

SPECIFICATIONS

SERRATED JAWS	MAXIMUM CAPACITY	MINIMUM CAPACITY
No. 383 HL	5/16 (.3125)" 8 mm	5/32 (.156)" 4 mm
No. 384 HL	1/2 (.500)" 12.2 mm	1/4 (.250)" 6.5 mm
No. 385 HL	3/4 (.750)" 19 mm	3/8 (.375)" 9.5 mm

No. 383-2 HL, 384-2 HL and 385-2 HL same, except with smooth jaws for bare aluminum wire.

Crescent is our trade-mark, registered in the United States and abroad, for wrenches and other tools. Sold by leading distributors and retailers everywhere and made only by

CRESCENT TOOL COMPANY, JAMESTOWN, NEW YORK

Cable's best friend

General Electric silicone rubber insulation protects against heat, overloads, ozone, aging, moisture and radiation

Double Capacity, Overload Protection — When used to insulate cable, silicone rubber gives you up to *twice* the current capacity, *twice* the overload protection as ordinary insulation. The superior electrical properties and wide operating temperature range of silicone rubber are the reasons.

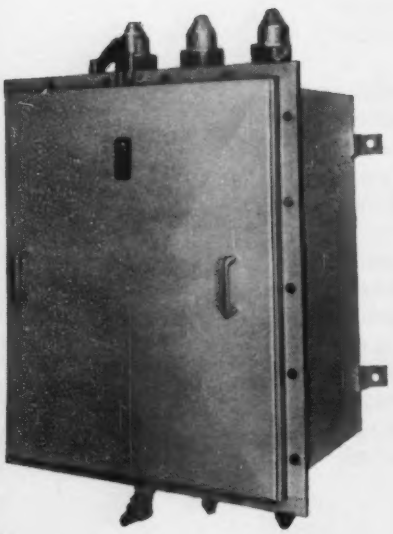
Greater Reliability, Longer Life — G-E silicone rubber insulation has long service life at temperatures from −55°C to 200°C, and it is virtually ageless under severe conditions of heat, ozone, sub-freezing, moisture, and radiation. Trust it to keep working long after ordinary insulation fails.

Possible Cost Savings! What's the price difference? More often than not, *none at all.* In old installations, use it in *existing* conduits. Capacity and protection goes up, costs go down. On new installations, you are buying the extra capacity and overload protection needed in the years ahead. Sound electrical insurance.

Get the full story on cable's best friend: silicone rubber. Write: General Electric Company, Silicone Products Dept., Section FF1160, Waterford, New York.

GENERAL ELECTRIC

Who ever heard of hanging 500,000 kva on a wall?



▲
Submersible style for use in basements or vaults where flooding is a possibility.

▶
Indoor-outdoor style for general application where there is no possibility of flooding.

Do it with S&C's new line of high-voltage metalclad fuses for wall mounting

Here is a steel-enclosed fuse that gives you economical and fully adequate high-voltage fault protection for small loads:

1. *At service entrances;*
2. *On transformer primaries;*
3. *At underground sectionalizing points.*

S&C's new line of metalclad fuses combines economy with high fault interrupting capability. Their compactness permits wall mounting, eliminating the floor area requirements of conventional free standing metalclad switchgear. And much less room height is needed.

These fuses are especially suited to applications that justify fault protection *only*—applications where infrequent load switching (and isolation for rare fuse replacement) may be done elsewhere.

To permit you to tailor the new S&C Metalclad Fuse—Type SM to your particular requirements, a complete selection of features and ratings is available:

- Indoor Style, Indoor-Outdoor Style, or Submersible Style
- 4.8 kv or 14.4 kv
- 200E or 400E continuous amperes
- Cable entrance by knockout, flange-mounted pothead (1/C or 3/C), or integral pothead (1/C)
- 45,000 kva to 500,000 kva fault interrupting, in convenient steps

For further information, call your nearest S&C Sales Office. Consult the Yellow Pages under "Electrical Equipment" for the telephone number and address in all principal cities.

S&C ELECTRIC COMPANY

4421 Ravenswood Avenue • Chicago 40, Illinois

Specialists in High Voltage Circuit Interruption since 1911

S&C

new I-T-E aluminum air break switch base

70% lighter... costs no more than steel

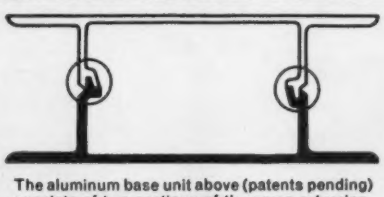
This new box section base (patents pending) designed in aluminum actually increases torsional rigidity over the present steel design. This results in a smaller degree of deflection under short-circuit conditions. It can also be installed with greater overhang which means more flexibility in installation. Reynolds engineers worked very closely with the I-T-E Circuit Breaker Company in designing the extrusion that made this economical box section possible. And, because it is aluminum, it resists corrosion and can't rust—ever. Result: lower *initial* cost—lower *final* cost—maximum life and improved appearance.

This new concept has been developed for switches in the 69KV class and up. For lower voltage ratings a series of extruded shapes have also been developed.

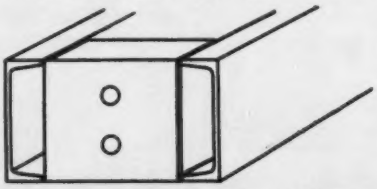
Regardless of whether you purchase or manufacture electrical equipment, aluminum's unique combination of advantages can be of value to you. Some of these advantages are: low cost, minimum maintenance, easier installation, attractive appearance, high thermal conductivity, strength, ease of fabrication, good availability and high scrap value.

For specific information and advice on how aluminum can help *you*, contact your nearest Reynolds Sales Office. Or, write *Reynolds Metals Company, Box 2346-EL, Richmond 18, Virginia.*

REYNOLDS ALUMINUM



The aluminum base unit above (patents pending) consists of two sections of the same extrusion. They are machine welded along the joining line. Previous steel construction below, involved two steel channels welded together with several cross members. New aluminum base simplifies fabrication, storage and inventory.



Watch Reynolds exciting TV programs on NBC: The Dick Powell **Reynolds Aluminum Show** every other Tuesday; **Say When,** weekdays; **All Star Golf**—in living color—every Saturday.

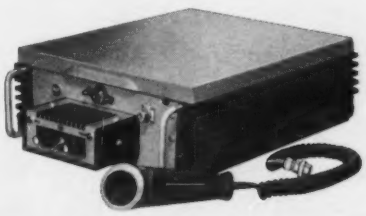
Wisely used transistors enhance the value of RCA "LD" 2-Way Radio and give it built-in dependability

In designing this efficient new "LD" equipment, RCA engineers wisely gave special consideration to the transistor. Only "stock" transistors capable of being serviced with existing test equipment and techniques are used—and only in circuits where they do the best job in cutting battery drain. Tubes are used where they can stand up under high temperatures, heavy voltages—jobs that tubes do best.

As a result the "LD" is not OVERtransistorized, is compact, yet accessible, miserly in power consumption yet value-packed to pack a punch in performance.

Leave the radio on when engine is off—battery drain is negligible. Use it on the roughest roads—transistors and sealed circuits give added assurance it can take it under gruelling conditions.

Specify the RCA "LD" and you can be sure it will stand in back of your endorsement. Lease or purchase plans available. RCA authorized service available. Ask your RCA Representative for complete descriptive literature. Or mail coupon below.



The Most Trusted Name in Radio

RADIO CORPORATION OF AMERICA

RADIO CORPORATION OF AMERICA
Telecommunication Center, Dept. BC-45
Meadow Lands, Pa.

☐ Please send me FREE literature on the new RCA Transistorized "LD" Mobile Radio.

☐ Have RCA Communications Specialist contact me and explain why this is today's best value in 2-way radio.

NAME_____ TITLE_____

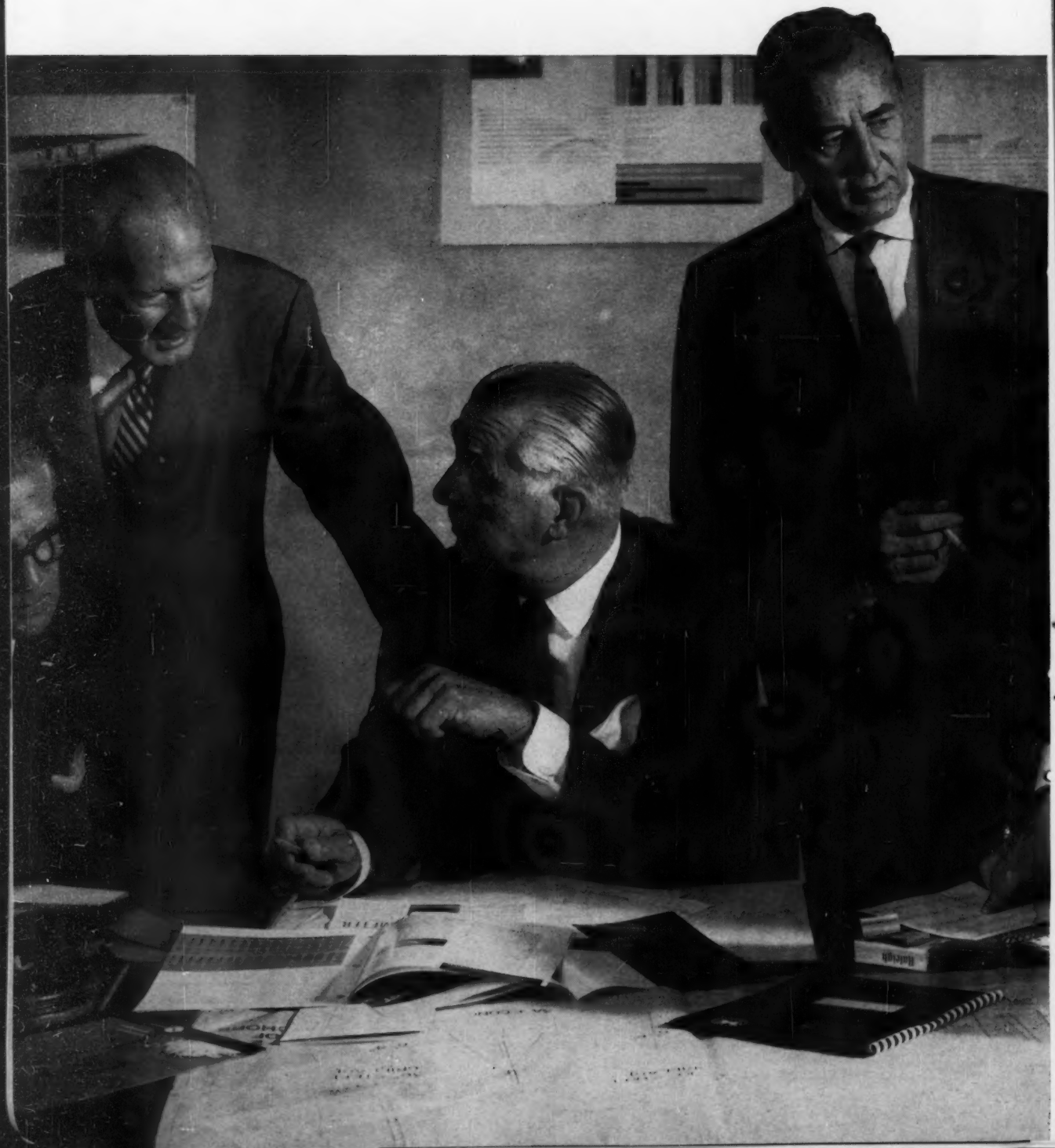
COMPANY_____

TYPE OF BUSINESS_____

ADDRESS_____ PHONE_____

CITY_____ ZONE_____ STATE_____

If it's your responsibility...



to evaluate distribution transformer performance, then it's important you consider Moloney!

...Why Moloney?

Because Moloney's concept of "Total Design" assures the best all-around efficiency per invested dollar!

When you evaluate transformers, the overall design concept is an important consideration. Through the years, Moloney has constantly improved the overall performance and quality of its transformers This progress is a reflection of the "Total Design" concept which coordinates design of all transformer components so that no feature is stressed at the expense of another.

When evaluating distribution transformers, keep "Total Design" in mind. You'll see what we mean when you compare all aspects of a Moloney Transformer with the features of competitive units.

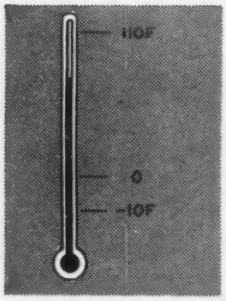
MEB1-20

MOLONEY ELECTRIC COMPANY

Manufacturers of Transformers and Switchgear for Utilities, Industry, and Electronic Applications

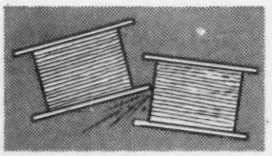
CABLE TALK

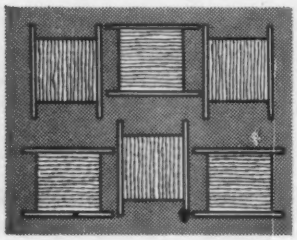
6 tips to help you make the most of your investment in wire and cable

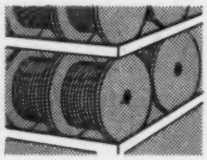


1. Avoid extreme temperatures –below 10F and above 110F (unless cable is specifically designed for this purpose). Low temperatures are seldom harmful to cable, but when they are combined with impact, flexing or other mechanical action, it's possible that the cable may be damaged by cracking, flaking or complete rupture of the coverings. Excessively high temperature, all by itself, can materially shorten the potential service life of stored cable. Thermoplastic components may soften and flow; rubber and many other materials undergo chemical and physical changes at high temperatures. You can avoid this problem by not storing cable near heating units, steam pipes, etc.

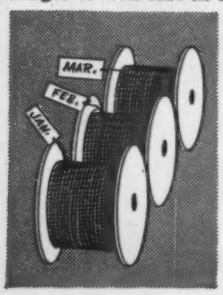
2. Avoid mechanical impact and crushing. Wire on a reel can be rendered useless by allowing the flange of another reel to crash against it. Arranging the stored reels in a crosshatch pattern is the simplest way to avoid this kind of accident. If space is at a premium, the reels may be stored in trays that allow only the flanges of adjacent reels to contact.



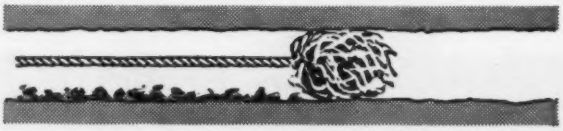




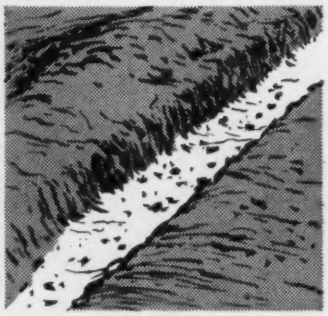
3. Use the oldest stocks first. Very few materials improve with age, so the sooner you use stored cable the longer it will last in service. Also, the less time a cable spends in storage, the less chance there is for damage. Keep rotating stocks so that the newest cable goes to the end of the line.



4. Swab conduit before pulling wire
A remarkable amount of abrasive material–nails, glass and such–can accumulate in conduit, pipe or duct before the wire is pulled through. And pulling a wire or cable through such litter could damage it severely. If you pull a swab through the conduit ahead of the wire to clear the way, you'll eliminate a big source of hidden installation damage.



5. "Direct burial" doesn't mean "on top of anything"
The specification "direct burial" on a cable doesn't mean that you can afford to bury the cable directly on top of whatever you might find in the earth. Trenches should be cleared of rocks and broken glass before the cable is buried. Freezing and thawing can make rocks shift position, and, possibly, exert enough pressure on the cable to cause premature failure. The same danger exists when wires that cross underground rest on each other. Moral: clear trenches before burying cable, bed the cable in sand, and keep crossed cables separated.



6. Pick the strongest component when pulling cable
When wire or cable is being pulled-in, either through conduit or aerially on poles, it's essential to put all the pulling tension on the strongest part of the cable assembly. Ordinary single-conductor material should have pulling tension applied to the bare conductor. Applying tension to the covering materials tends to stretch them, and can lead to breaks in some cases. Always pull preassembled aerial cables by the messenger, not by the insulated conductors. Interlocked-armor cable should never be pulled by the armor, since this may cause severe damage by unlocking the armor.

* * *

This collection of ideas comes from many years of probing into wire and cable problems–and solving them. It's likely that we've come across some problems just like yours, and together we could probably work out a fine solution. So, please give us a call, or write Anaconda Wire and Cable Company, 25 Broadway, New York 4, New York. Department EFL-1-EW. 61304U

ASK THE MAN FROM
ANACONDA®
FOR TECHNICAL ASSISTANCE ON WIRE AND CABLE PROBLEMS

Up high at low cost in safety

the new PITMAN PELICAN™

Now your crewmen can work aloft in mechanical and electrical safety. No more bobbing ladders or dangerous, swaying crowsnests – the operator simply steps into the Pelican's fiberglass bucket, presses the easy-to-use control levers, and sweeps aloft in seconds!

The rigid fiberglass boom holds him steady with no "creep," even if hydraulic lines were to be damaged. He can change position instantly, with all the precision of a high-priced machine.

There's no longer any need to "ground" highly-skilled men when their climbing days are past. The Pitman Pelican puts them back to work—at jobs up to 40 feet high—faster and more safely than with old-style ladders or irons . . . and at far less cost than other aerial devices on the market.

Yes, the Pitman Pelican costs even less—in initial investment and maintenance—than old-fashioned powered aerial ladders. Available in 28′, 32′ and 36′ sizes; can be mounted (depending on size) on most 1 and1½- ton trucks. Turn this page for more details . . .

for the cost of a powered ladder,

you can put your men aloft in this

PITMAN PELICAN™

the lowest-cost all-hydraulic fiberglass aerial bucket

Lightweight fiberglass bucket levels itself hydraulically, has 300 lb. capacity. Unit is designed for use without outriggers. Optional use of torsion bar assembly will increase stability. Boom revolves 360° in either direction, elevates to 75° above horizontal, extends to full reach in seconds. Entire telescoping section is fiberglass.

The Pitman Pelican is ideal for work on electrical distribution lines, street light maintenance, tree trimming and other high work. Note convenient controls on rear lip of fiberglass bucket; dual controls on truck also rotate, extend and raise boom simultaneously.

Pelican's compact design permits installation on most popular-sized utility line trucks; for example, a 28′ Pelican mounts on most 1 ton trucks. Note wide passage on either side of pedestal, making truck deck accessible.

Pelican trims for travel in moments. Operator simply retracts boom, rotates it into forward carrying position, and tips the bucket (hydraulically) up into the yoke. Overhead clearance is less than ten feet when stowed for travel.

Your nearest Pitman Distributor will be happy to demonstrate this low-cost, high-reaching aerial bucket—a card or a call will do. Or, simply contact . . .

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Stored Logic provides these benefits, and the TRW-530 is the first control computer with Stored Logic.

Stored Logic in the TRW-530 gives you economy in programming, economy in operating time, economy in memory requirements.

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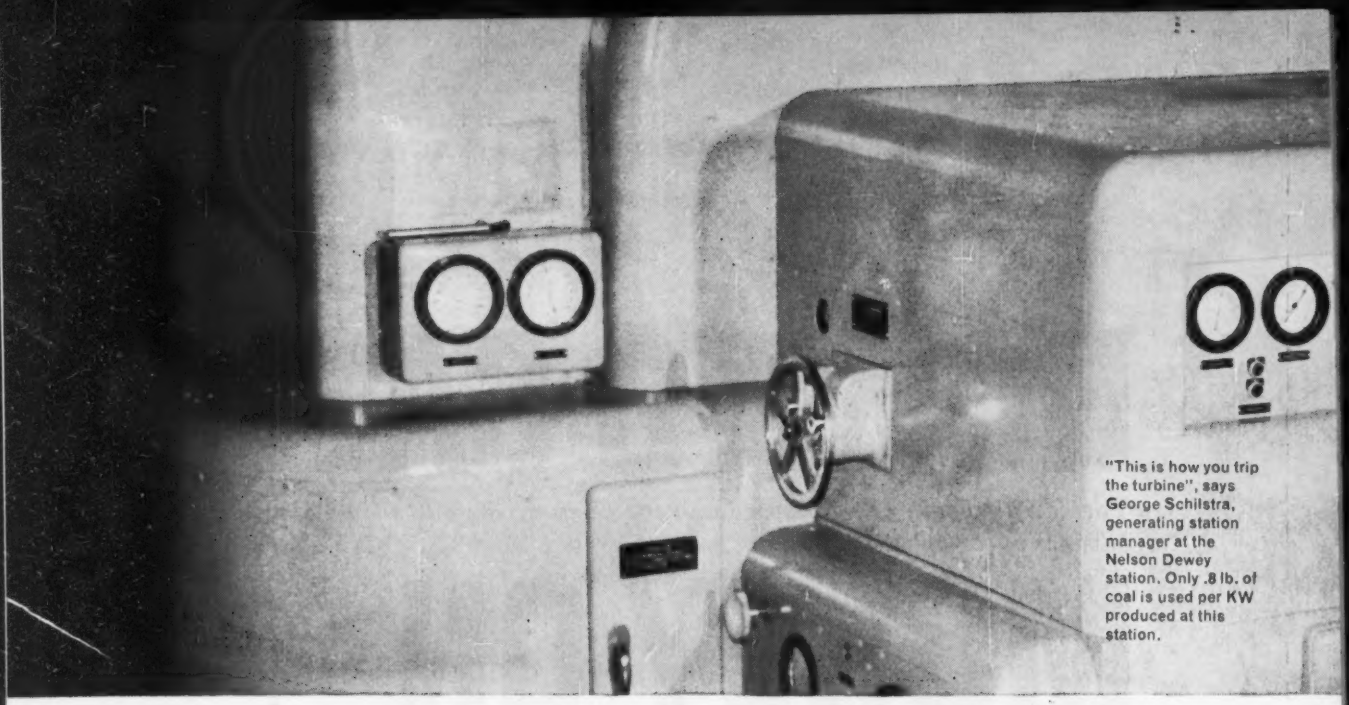


"This is how you trip the turbine", says George Schilstra, generating station manager at the Nelson Dewey station. Only .8 lb. of coal is used per KW produced at this station.

BY R. C. "ROLLY" BLEIMEHL

About the Author. Rolly Bleimehl has been providing technical service on lubrication to customers of our parent company for fifteen years. He has a mechanical engineering degree from Iowa State College and has completed the Company's Sales Engineering School at Whiting, Indiana.

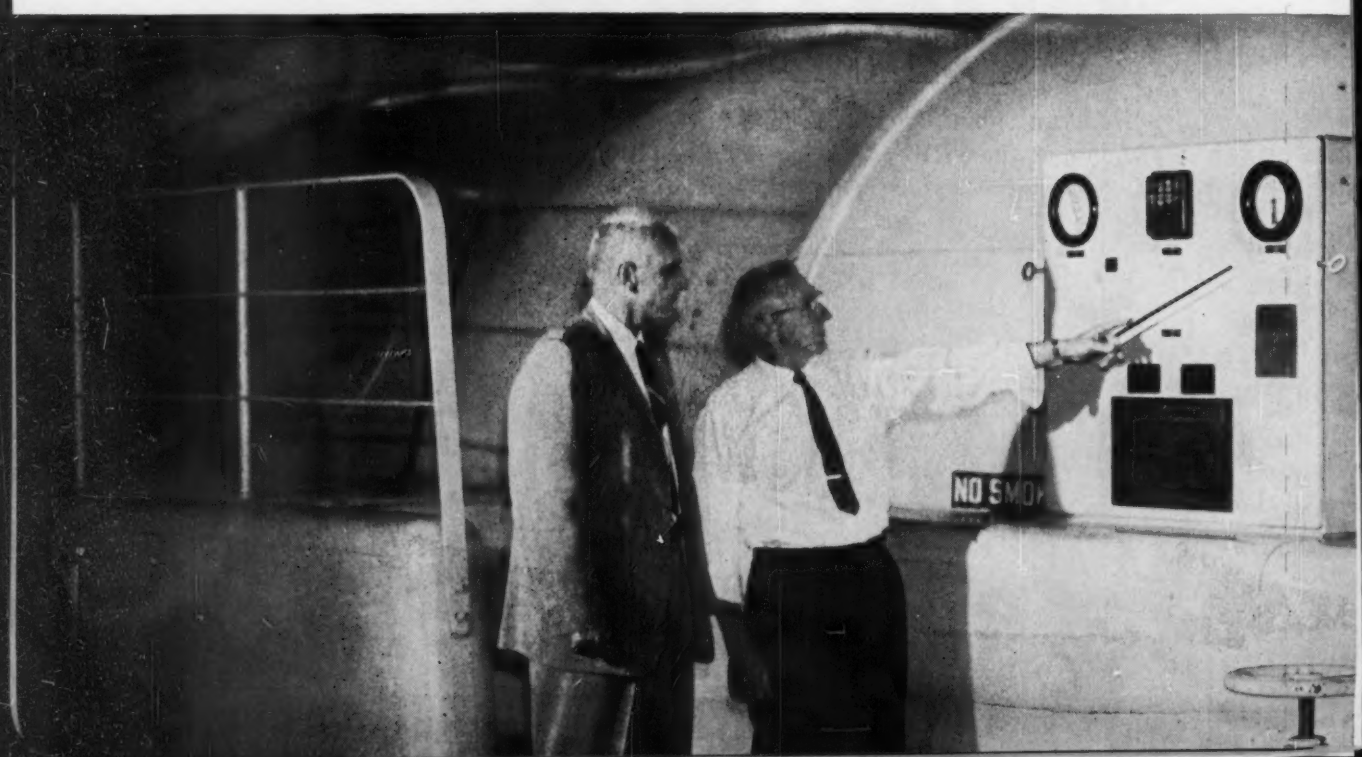
* * *

In 1954, when the first of two 75,000 KW turbines went into service at Wisconsin Power & Light Company Rock River generating station, Beloit, management had to make a decision on a turbine oil. Two factors helped them decide in favor of NONPAREIL Turbine Oil: (1) NONPAREIL's performance history and (2) the technical service available from American Oil Company.

Performance history: Each fill of NONPAREIL Turbine Oil carries with it a life-of-turbine guarantee. This means that if, during the life of the turbine, the neutralization number of the oil ever rises above the low limit of 0.15, the oil will be replaced free of charge. Some fills of NONPAREIL Oil have been in service more than 35 years under this life-of-turbine guarantee.

Technical service: I'm located at Madison, only a short distance from Beloit. Thus, I'm always handy to make periodic calls at the station to answer questions about the oil. And we take samples of the oil regularly for analysis at our Whiting, Indiana, laboratory (at no expense to the utility).

Putting these two together—product performance and technical service—Wisconsin Power & Light Company decided it made good sense to specify NONPAREIL Turbine Oil. The satisfactory performance of the oil in the first turbine at Beloit helped the management decide on



This is
AMERICAN OIL COMPANY
in action

Technical Service, Product Performance

it for the second 75,000 KW unit when it was installed in 1955. For the same reason management selected NONPAREIL when their 100,000 KW turbine went into service at the Nelson Dewey station, Cassville, Wisconsin, in 1959.

Get more information about NONPAREIL Turbine Oil and about the lubrication technical service that is available. Phone your nearby American Oil Company office.

Quick facts about **NONPAREIL Turbine Oil**

- Will not permit formation of harmful acids.
- Will not permit formation of sludge or oil varnish.
- Will maintain good demulsibility or water-separating characteristics.
- Has high resistance to foaming.
- Contains adequate rust inhibitor.

AMERICAN

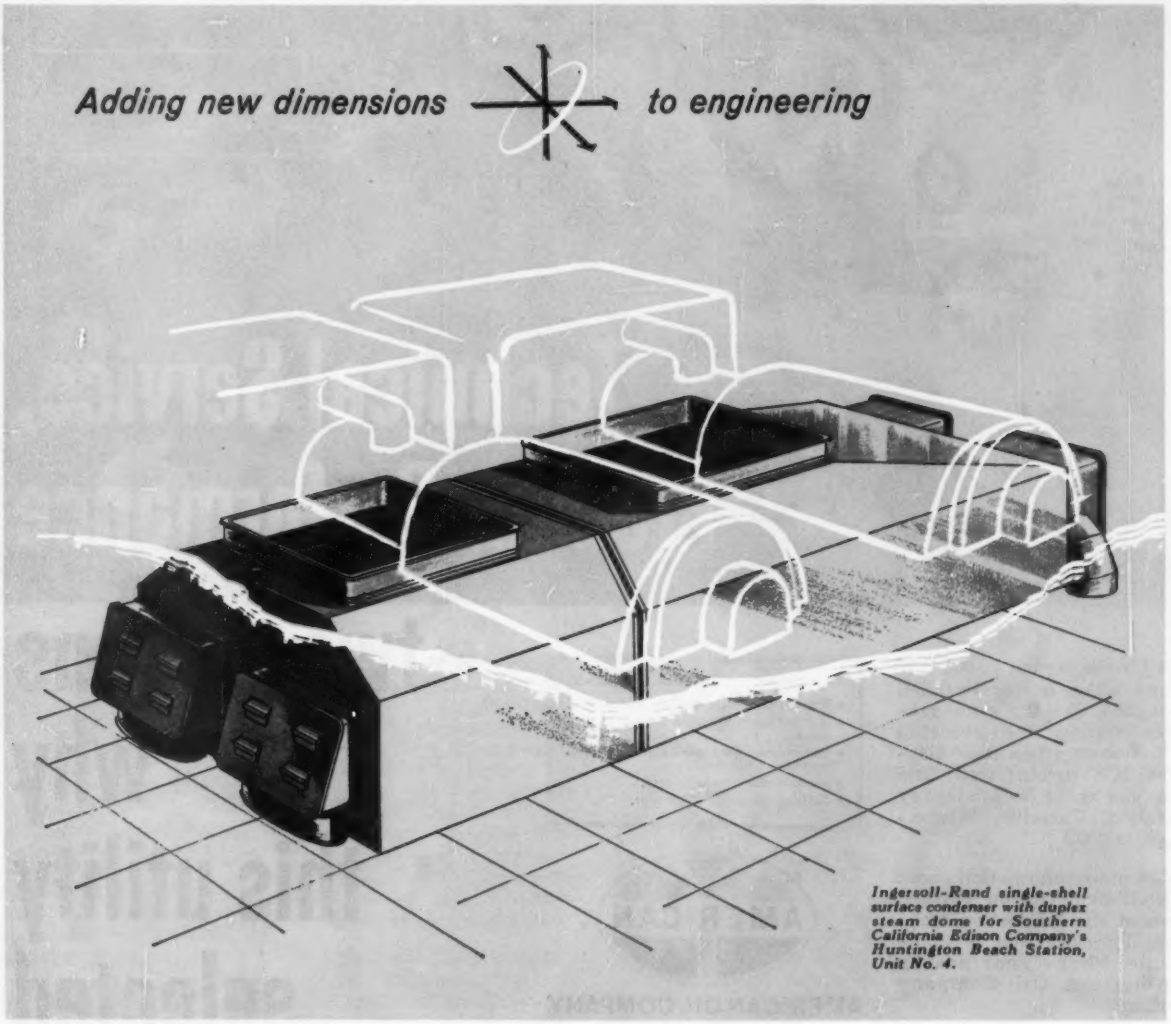
AMERICAN OIL COMPANY
910 S. Michigan Ave., Chicago 80, Ill.

--two reasons why this utility selected

NONPAREIL Turbine Oil

Leslie Hoffman (right), Rock River generating station manager, goes on an inspection tour of one of two 75,000 KW turbines with American Oil's Rolly Bleimehl. Rock River is the largest station in Wisconsin Power & Light Company system.

Adding new dimensions *to engineering*



Ingersoll-Rand single-shell surface condenser with duplex steam dome for Southern California Edison Company's Huntington Beach Station, Unit No. 4.

Here's a steam condenser that's LONG ON TUBES and SHORT ON HEIGHT

(It's the shape of things to come when capacity is high and head-room is low)

Here's a new way to package 105,000 sq feet of steam condensing surface. Many refer to it as our "Long John" design. It features 54 foot long tubes, has an overall length of 65 feet and requires *only 18 feet of headroom.* The offset duplex steam dome is specially engineered to optimize distribution of steam and provide for better overall turbine-condenser efficiency.

At Ingersoll-Rand we like to apply new ideas and design concepts to the *overall engineering problem.* That's why I-R condensers continually set the pace for highest performance and adaptability to any turbine-condenser arrangement.

PUMPS • CONDENSERS • EJECTORS & VACUUM PUMPS
AIR & ELECTRIC TOOLS • AIR COMPRESSORS

Ingersoll-Rand®
306A4 11 Broadway, New York 4, N.Y.

Now measure wire by color!

Olin Conductors—creators of color for secondary cable over a year ago—now announce another industry "first": SIZE IDENTIFICATION BY COLOR in service drop cable!

Olin Conductor's COMPRESTO® has been combined with DuPont HYPALON* to create a "one shot" 600 volt insulated jacket that has insulation resistance values consistent with that usually found only in regular TWO-COAT type service drop cables.

Because of its superior **natural** resistance to weather, oxygen and ozone, colored Hypalon covering does not require large quantities of carbon black. Thus, Compresto size-by-color service drop may be colored with industry accepted—lasting—color coding, without damage from the sun's ultraviolet rays. In fact, Compresto with Hypalon in color has a longer life—weathers better—than the best grade of black in any other commercially available compound!

For a free self-adhesive Size-Identification Color-Chart suitable for use in warehouse or service truck, simply mail the coupon below to Olin Conductors, P. O. Drawer 6039, Chattanooga, Tennessee.

Now COLOR Tells The Size—

	BLACK	RED	GRAY	GREEN
AWG Size	#6	#4	#2	#1/0
AWG Size		#2/0	#3/0	#4/0

Olin CONDUCTORS

METALS DIVISION, OLIN

P. O. DRAWER 6039 • CHATTANOOGA, TENN.

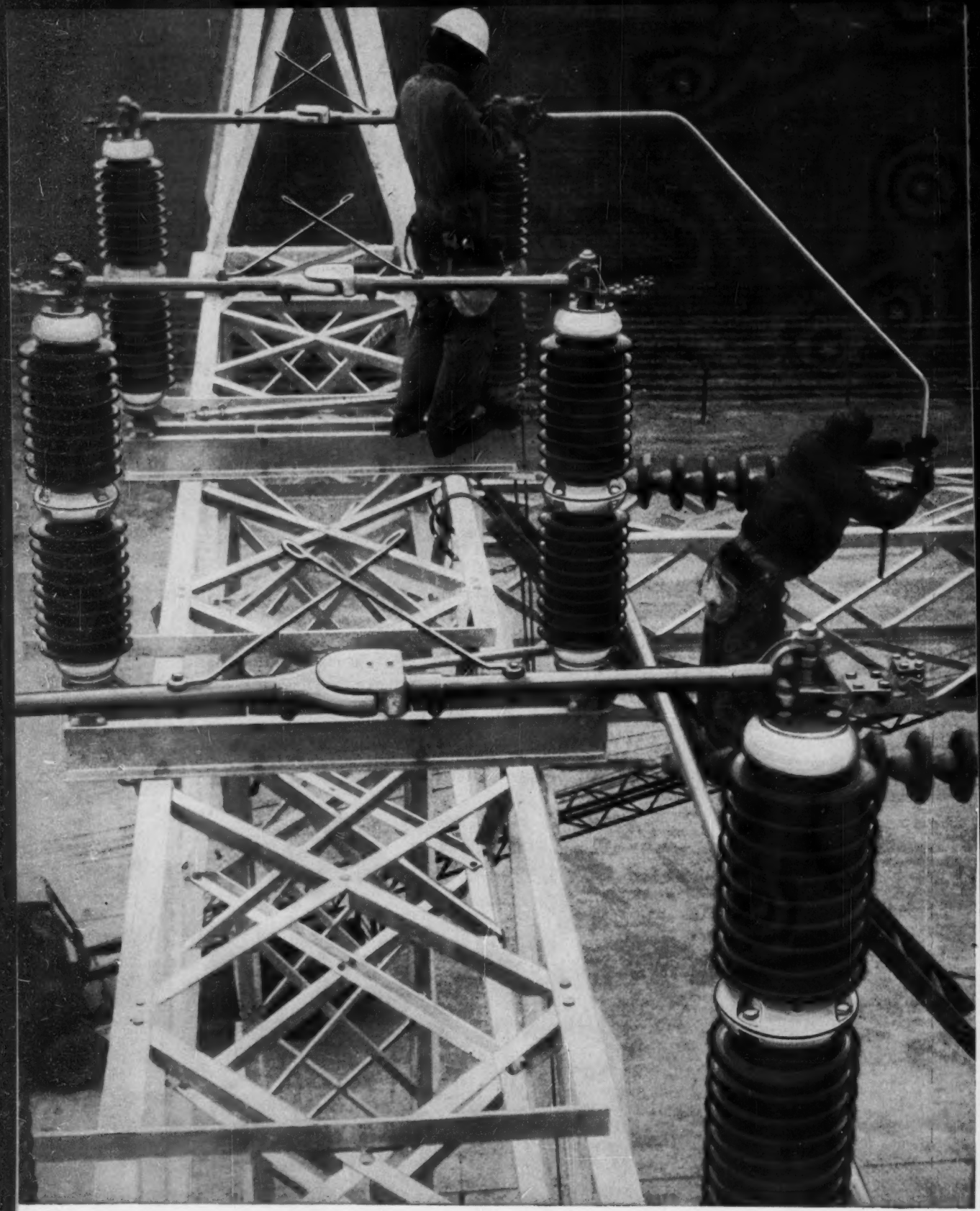
Please send free of charge _____ Olin Size-Identification Color-Charts. (indicate number)

NAME _____

COMPANY _____

STREET _____

CITY _____ STATE _____



Southern States 115 kv, 600 ampere Type GG switches being installed. The GG is available in voltage ratings from 34.5 kv – 161 kv and continuous current ratings of 600 and 1200 amperes.

KEEP PACE ELECTRICALLY

CURRENT FOLLOWS LOW RESISTANCE PATH THROUGH SOUTHERN STATES' BRAIDLESS AIR SWITCHES

Southern States has solved the big problem of providing efficient current transfer in high pressure, braidless side-break air switches. A unique design overcomes any question of reliability in the two current-carrying swivel assemblies inherent in this type of switch.

As a result, in the new Southern States Type 57L and Type GG you can now be assured of low resistance through each swivel assembly, adequate capacity for short circuit currents, and freedom from corrosion and contamination.

This is accomplished by the four-piece swivel units* consisting of carefully machined terminal and blade castings, hinge pin, and pressure clamp —securely bolted together so that the pressure clamp and terminal casting fit into deep, matching grooves on the hinge pin. The silver-plated grooves provide a natural barrier to foreign matter, act as a stable bearing surface for the terminal, and furnish a liberal contact area. The assembly is permanently sealed with a non-aging lubricant.

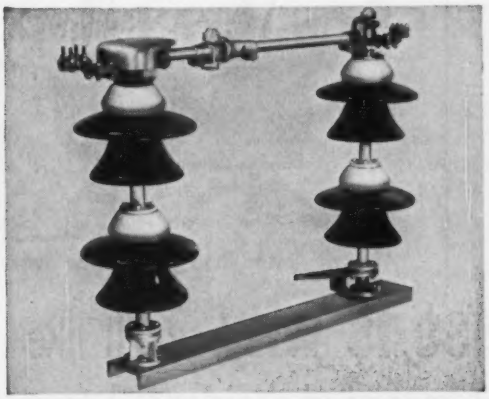
The hinge pin and terminal casting are kept under high pressure by a stainless steel coil spring (insulated by a nylon spacer) to establish the most efficient current interchange point.

The entire assembly, although under high pressure, rotates smoothly—without binding or wedging. It operates satisfactorily under short circuit conditions and well within the limits defined by NEMA for continuous current performance.

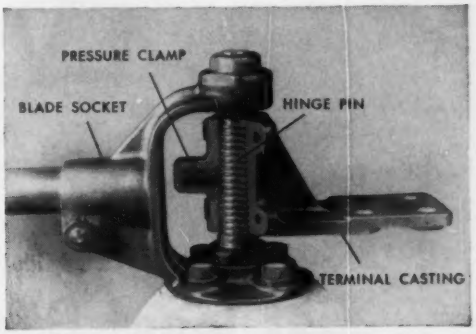
AMPLITACT® contacts are added assurance of contact performance under extremely high fault currents.

For complete details on these new braidless switches, contact your Southern States representative or write directly to us.

*Toggle point of 57L switch blade uses modified version of this assembly.



Type 57L braidless side break available in voltage ratings from 7.2 kv - 161 kv and continuous ratings of 600 and 1200 amperes.



SWIVEL ASSEMBLY—CUTAWAY VIEW

The GG uses the swivel assembly shown as the pivot on both rotating insulators. The 57L uses an identical assembly on its rotating insulator and the same construction principle at the toggle point of the 57L blade.

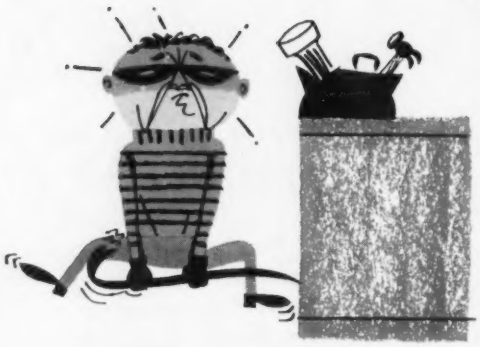
SOUTHERN STATES
HAMPTON, GEORGIA

IN CANADA: DOMINION CUTOUT CO., LTD., TORONTO

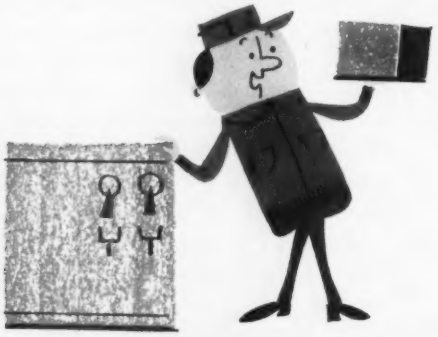
ALLIS-CHALMERS

A-1546

fits between sidewalk and street



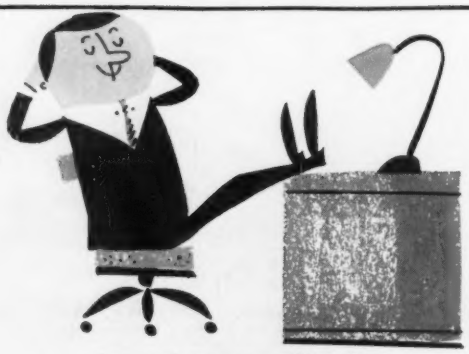
tamper-proof interlocked doors



removable cable compartment

painted "invisible" green

all handles and switches on LV side



lower than your office desk

at least 6 reasons why you'll like the new Allis-Chalmers surface-mounted residential transformer

There are several other reasons too! *The removable cable compartment speeds installation.* And this compact new transformer makes a good neighbor . . . it's designed and painted to fit right into the background. Its tamper-proof interlocked door makes it safe for use where there are children playing. Disconnect switch and secondary breaker handle are on low-voltage side for added safety.

Get all the facts about the remarkable new Allis-Chalmers surface-mounted residential transformer. Just call your nearby A-C office or write **Allis-Chalmers,** Power Equipment Division, Milwaukee 1, Wisconsin.

Editorial Comment

NOVEMBER 20, 1961

Sporn Announces Retirement

Philip Sporn has announced his official retirement from active management of the American Electric Power Co.

This is a truly unique man. There is no aspect of the electric power business—management, finance, engineering, operations, load building, public relations, politics or other—that has eluded his sharp, deep understanding—or his often acid comments.

His pioneering accomplishments are too numerous for us to enumerate, but it is worthy of note that many of his kudos have come from outside of the power industry. He has been described as a frustrated editor; indeed, his prodigious output would (and, we understand, may) fill a considerable volume.

Sporn is held in high respect by all who know him; his voracious work appetite and unflagging energies have guaranteed their numbers as legion.

Perhaps his greatest **achievements** lie in the engineering field. Uncounted cases of his pushing forward the boundaries of mechanical, civil, electrical and system engineering come easily to mind, all traceable to his devotion to the goal of staying ahead of the field. Often he has been so far ahead as to invite attack, but those who would oppose him have been well-advised to be well-prepared.

We believe some of his greatest **contributions** lie in his outspoken, often impolitic, and frequently unpopular, criticisms of his own industry. That he is controversial is an understatement; that he is influential is a blessing.

For Philip Sporn possesses the courage of a great dissenter—and the consummate skill to back the record of dissents with an extremely high batting average of being right.

We cannot believe that Sporn's restless voice will be stilled for a moment by his formal retirement. We hope it will ring in the industry's council chambers for a long time to come.

Tell the Company Story in a National Setting

Individual electric companies do a pretty good job at getting over their story at the local level. But the industry has lagged miserably in telling its story at the national level. This failure has continually been a burden in the political arena.

Edison Electric Institute President Philip Fleger has set out to try to remedy this deficiency. He is telling his audiences around the country, "We must tell our customers what we are doing as companies. But this is not enough. We also must tell them what we are doing as an industry. . . . We must place our company stories of future planning and building in their national perspective by emphasizing the story of our industry's growth."

The investor-owned utilities made a very creditable start in this direction with handling of their companies' aggregate plans for ten years and $8 billion of transmission and interconnection construction. Many companies carried through by setting their own plans in the perspective of the national picture. Press clippings, now in, attest to the way the newspapers have accepted this approach.

Edison Electric Institute deserves commendation for providing the leadership in this instance, making industry information available on a national scale. We hope individual companies will continue to follow through, tying in their own future announcements to the national scene.

It is one way in which the industry will be able to answer its political critics at the national level.

VISHER

OCD Aims for NEAR In Several States

State-by-state, utility-by-utility approach is now being used to implement NEAR, but no one has signed up yet. Federal loans studied as aid to utility financing

Despite conflicting reports from around the country, the Administration is going ahead with its plans to release specifications of National Emergency Alarm Repeater (NEAR) equipment in early December. But the problem remains of who is going to buy it.

According to Paul Visher, director of operations for the Defense Department's Office of Civil Defense, his main concern is with the receivers that will go into the home. Visher is still aiming to have utilities buy this equipment (as well as the sending equipment) because he believes this would simplify distribution problems, and more importantly, help in quality control.

But so far, he has been unable to get any utility or state public utility commission to agree to the plan. However, he and his staff are working hard on it, with California, Wisconsin, and Georgia now considered as good prospects. And Visher adds that OCD will continue trying until it is successful.

Visher stresses that implementation of NEAR must be done on a "total," though localized, basis. That is, when the first few NEAR installations are made, they should encompass at least whole utility systems, with legal, financial regulatory and other problems, as well as technical ones, all being worked out.

Therefore, OCD is going ahead with its NEAR plans, but instead of an immediate nationwide implementation, the prospects are for a gradual state-by-state, utility-by-utility program.

On other NEAR matters, Visher has this to say:

- The NEAR concept is considered technically feasible, even though different utility systems have different characteristics. "I'm not sure you can get a completely universal system. You always will have problems, but NEAR (technically) is on a broad enough base to proceed."
- The various industry groups (American Public Power Assn, Edison Electric Institute, National Rural Electric Cooperative Assn) were approached as sounding boards, but because these groups cannot speak for their members individually, further contact with the industry will be done on an individual utility basis.
- Upcoming tests in Michigan will be concerned mainly with the sending equipment, and therefore cannot be considered on a par with hoped-for "total" installations. On this matter, spokesmen for both Consumers Power Co and Detroit Edison Co have told *Electrical World* they have not been advised of any change of or cancellation of plans regarding the proposed statewide tests in Michigan. It had been reported earlier (EW, Nov. 6, p 56) that the test would be skipped.

From other Pentagon sources, it has been learned that one reason for the change to the more conservative state-by-state approach to putting NEAR into effect was the criticism coming from the nation's power systems. But NEAR officials still hope that 15 or so major systems will adopt NEAR quickly, instead of the few now anticipated.

Although the NEAR receivers have been changed back to a plug-in model from the recently-proposed wired-in version, officials hope that homeowners will go ahead with wiring, as it is more reliable.

While there has been no change in the Pentagon's present thinking that the NEAR system should be financed by utilities, the Pentagon is working on a plan for federal loan guarantees or outright loans to utilities to buy the devices. Federal appropriations are not considered realistic now, but utility complaints about financing seem to have provided a major stumbling block to moving ahead without some sort of federal assistance. Loans would probably go through established channels, such as the Rural Electrification Administration for co-ops. But one Capitol Hill source feels that such loans would need Congressional authorization first.

Meanwhile, in California, following a meeting between NEAR officials and state and utility representatives (EW, Nov. 13, p 48), a state official said the California Public Utilities Commission wanted to make a further study before throwing its weight behind the NEAR plan. The meeting was reported to have bogged down on possible serious legal questions and legislation may be required for the PUC to implement the program.

But it was put squarely up to utility representatives at the meeting that without their cooperation, the plan would not get off the ground. Pacific Gas & Electric Co and Southern California Edison Co

representatives said the NEAR plan was certainly in the public interest and that they wanted to do all they could to cooperate. But Pacific G&E pointed out that there are a lot of technical problems involved and it will take time to study them.

In Georgia, a meeting was held some time ago by NEAR, state, and utility officials. This was the first state approached and there was no attempt made to get commitments. Another meeting is scheduled, probably in December.

Beaufort Gas Turbine Damaged in Accident

A serious mechanical failure was followed by a fire which swept through South Carolina Electric & Gas Co's $1-million gas turbine unit at Beaufort Nov. 2, leaving the facility extensively damaged. A company spokesman said the cause of the incident had not been determined, but damage was set at about $650,000. There were no injuries.

The 11,250-kw plant was running at the time of the accident, and was carrying about full load. The plant had first gone into service on July 30 of this year and had been used intermittently for peaking service.

In Schenectady, General Electric Co, which supplied the unit, said "an intensive investigation is under way to determine the cause of the accident. While the cause has not yet been determined it appears that neither the turbine rotor, compressor rotor, nor the combustion system was involved in initiating the accident.

"There was considerable mechanical damage to the gas turbine, while the generator and control cab were damaged in the resulting lubricating oil fire. The turbine and compressor rotors remained intact, although the distance piece between them was fractured.

"There is nothing to indicate that the accident was anything but an isolated occurrence, and General Electric has not recommended any restrictions on operations of other gas turbines. More than 40 GE gas turbines of the same size and similar design have been in successful operation for periods as long as four years. A replacement gas turbine-generator is scheduled for shipment to (the utility) by Dec. 1, 1961."

United Engineering Center Dedicated

With former president Herbert Hoover heading the guest list, a roll call of those attending the dedication of the new United Engineering Center in New York Nov. 2 would have sounded like Who's Who in Engineering.

One of the highlights of the day occurred when Dr Mervin J. Kelly, former chairman of the board of Bell Telephone Laboratories, was presented the Hoover Medal by Walker Cisler, president of Detroit Edison Co, and Hoover.

The 20-story building houses 19 engineering groups representing some 300,000 engineers. American Institute of Electrical Engineers' offices occupy all of the 10th and 11th floors, and part of the ninth. It is located on E 47th St at First Ave, just across from the United Nations Plaza.

DR KELLY RECEIVES THE HOOVER MEDAL from President Hoover (center) and Walker Cisler (right) for his work on behalf of the United Engineering Center

Lignite Expands Market For 200-Mw Steam Plant

Lignite Electric Power Cooperative Inc has moved to strengthen its bid for a $44-million Rural Electrification Administration loan to build a 200-Mw generating plant near Stanton, N. D.

"We have now expanded our plans in conjunction with Dairyland Power Cooperative to serve most of Minnesota through displacement," said K. S. Vig of the Minnkota Power Cooperative at the 1961 Area Power Conference at Minot, N. D. Minnkota is a member of the Lignite Electric Power Cooperative.

Previously, Lignite had proposed its plant to serve preference customers primarily in North and South Dakota. But the expanded plan, explained by Vig, will enable Lignite to serve co-ops in southern Minnesota as well. This expanded coverage, Lignite hopes, will give its request the edge over a request by the Basin Electric Power Cooperative for a $144-million REA loan to build a 200-Mw plant and associated transmission lines in the same area (EW, May 22, 1961, p 62).

Under the new plan, Lignite and Dairyland will contract for a given block of power with Cooperative Power Assn, a group of 18 rural cooperative systems in southern and western Minnesota. Lignite will supply power to load centers of Northern States Power in North Dakota at Minot, Grand Forks, and Fargo. Dairyland will supply Northern States Power's load centers in Eau Claire and other areas.

In return, NSP will supply Cooperative Power Assn's loads from its generating facilities in the Minneapolis area. Other investor-owned companies cooperating in this venture, said Vig, are Otter Tail Power Co, Interstate Power Co, and Minneapolis Power & Light Co.

Besides being concerned with winning the REA loan over Basin, Lignite must also keep an eye on the proposal from 14 Midwest utilities which urged the "integration of the federal hydro system on the Missouri River with the locally operated thermal systems in the area" (EW, Nov. 6, 1961, p 54). The integrated system would firm the federal hydro system, and enable it, according to the utilities, to serve all preference load in its present marketing area.

If such a pool were formed, there is doubt whether additional generation by Lignite would be needed to take care of preference customers in Minnesota. The cooperative's new proposal appears to be predicated on its feeling that integration of the federal hydro on the Missouri with local thermal stations will not be accomplished. Lignite spokesmen say, however, that the pool, if it is accomplished, would not block their plan, but rather, would strengthen it.

In addition to the Lignite proposal, the Area Power Conference also heard the details of the Upper Mississippi Valley Power Pool from Frank Linder, of the Dairyland Power Cooperative. Linder reported that since the agreement was signed last February, applications for membership have been received from the Rural Cooperative Power Assn, Lake Superior District Power Co, and Cooperative Power Assn. Net generating capability of the pool, including units scheduled for 1963, will be 3,245 Mw.

Most Efficient Plants, Systems Listed

10 Most Efficient Steam Plants–1960

Name	Company	Heat Rate Btu	1959 Standing
1. Clinch River	Appalachian Power	8,975	2
2. Dickerson	Potomac Electric Power	9,014	1
3. Kanawha River	Appalachian Power	9,061	3
4. G. G. Allen	Duke Power	9,086	8
5. Clifty Creek	Indiana-Kentucky Elect.	9,139	7
6. Eddystone	Philadelphia Elect.	9,148	..
7. D. E. Karn	Consumers Power	9,160	..
8. Muskingum River	Ohio Power	9,173	5
9. Kammer	Ohio Power	9,196	11
10. Tanner's Creek	Indiana & Michigan Elect.	9,209	9

9 Most Efficient Systems–1960

(Under 10,000 Btu Avg.)

Company	1960 Heat Rate*	1959 Rating	1959 Heat Rate*
1. Tennessee Valley Authority	9,540	1	9,620
2. Duke Power	9,611	4	9,820
3. American Electric Power	9,619	2	9,725
4. Southern California Edison	9,814	3	9,795
5. Consumers Power	9,857	5	9,912
6. Carolina Power & Light	9,884	..	(over 10,000)
7. Niagara-Mohawk	9,889	..	"
8. South Carolina Electric & Gas	9,956	..	"
9. Potomac Electric Power	9,988	..	"

* Weighted Average—All plants, including older standby plants
Source: Federal Power Commission

Gas Turbine Bids Asked For Ohio High School

The Maple Heights (Ohio) school board is advertising for bids on a gas turbine for its new high school, along with bids for a conventional boiler system.

Cost savings of the turbine for the electricity, heating, and air conditioning are estimated by Cleveland architects to be from 20 to 30% over a conventional installation using utility supplied electricity.

One turbine producer will propose three 340-hp natural gas jet engines driving three generators. The exhaust would provide heat and year round air-conditioning for the building.

LINE CREW SETS NEW POLE replacing one destroyed by fire. More than 100 poles were burned in Los Angeles

HOMES IN THE BEL-AIR—BRENTWOOD AREA were overrun by wind-swept flames. Over 450 homes were destroyed

Utilities Battle L.A. Brush Fires

Electric utility losses in the first two brush fires which recently struck Los Angeles were over $200,000 with the heaviest damages to Los Angeles Department of Water & Power facilities.

Utility damage was mostly in the Bel-Air—Brentwood fire. In this fire LADW&P lost 100 poles, 27 miles of bare copper cable, 15 distribution transformers and 250 overhead services. Overhead service loss was estimated between $135,000 and $170,000.

The Department also lost 250 underground services, about 730 ft of primary underground cable, plus eight primary cable joints with a total loss of approximately $53,000.

Southern California Edison Co losses were in the second fire, Topanga Canyon, and amounted to nine poles and three transformers.

Both of the brush fires which swept through areas in the Santa Monica Mountains roughly in northwest Los Angeles started Monday, Nov. 6.

The Bel-Air—Brentwood fire started first and was the most destructive, sweeping through exclusive Los Angeles canyon homes including homes of movie stars and millionaires.

By the time the fire was contained it had roared through the Bel-Air—Brentwood residential districts, destroying 447 homes which ranged from $30,000 to $300,000 in value. A total of 456 homes were destroyed in both fires.

The Bel-Air—Brentwood fire was reported contained by Wednesday with the second fire in Topanga Canyon finally contained Thursday night. The second blaze swept toward the ocean and kept the ocean-side community of Pacific Palisades alerted until it was contained.

Both utilities had men in the fire-fighting lines. The Department had 90 men in the Bel-Air—Brentwood area Monday and Monday night working on the overhead service. On Tuesday and Wednesday this had increased to 150 men. In addition, 70 men worked out of the underground division, first cutting off services and then getting service back into operation.

Some crews worked 24-hr shifts. Most of the damage to homes occurred in the early hours of the fire on Monday. By Wednesday morning, electric service interruptions had been largely cleared, although work was still under way in repairing the underground cable which served the areas where the fire damage was greatest.

Southern California Edison had some 75 men working. Their efforts with back pumps were credited with saving some 27 poles from burning. Edison used its helicopter on a few missions Tuesday to coordinate ground activities. Most of its men went on the lines Monday and were off by 5 am Tuesday. Service was interrupted for a few hours.

LADW&P had dispatchers equipped with two-way radio-telephones in the central command post setup to fight the fire. The dispatchers coordinated the field crews.

As *Electrical World* went to press, new brush fires were raging in the Los Angeles area.

Failure of 115-Kv OCB Causes Toronto Outage

Failure of a 115-kv oil circuit breaker resulted in the loss of load in substantial portions of downtown Toronto on Nov. 7. Load interruptions varied from 2 to 35 min, but most customers were without power only 5 or 6 min.

Trouble began at 2:05 pm when a single-phase ground switch on an Ontario Hydro 115-kv circuit closed. The circuit connected a large terminal substation with the substation where the switch closed. The 115-kv breaker at the terminal station cleared the fault on three occasions and subsequently failed on a simple closing operation at 2:29 pm, resulting in loss of load amounting to 250 Mva on the Toronto metropolitan system.

Coal-and-Water Slurry Burned As Delivered by Pipeline

Werner Station trial demonstrates untreated firing; spurs interest in proposed pipeline

PUMPS are lowered into barge for unloading 70% slurry at E. H. Werner Station for the trial firing and burning

Direct firing and burning of a coal-and-water slurry as it comes from a coal pipeline was successfully demonstrated at E. H. Werner Station of Jersey Central Power & Light Co in a trial that started October 18 and was completed November 10.

Until now coal slurry delivered by pipeline has been fired in power plant boilers only after expensive drying and dewatering. At Werner Station a slurry of 70% coal and 30% water was burned without drying in a 475,000 lb per hr boiler fired by two unmodified cyclone furnaces using a technique developed by Babcock & Wilcox Co.

Successful demonstration of the technique further contributes to the economic feasibility of pipelines for the bulk transportation of coal from mine to power plant. Such a pipeline across Pennsylvania to the East Coast was proposed in the fall of 1959.

Saves Investment of $7 Per Kw

Moreover, direct firing of pipeline coal slurry eliminates expensive coal-handling equipment such as barges, docks, conveyors, railroad sidings, bunkers and pulverizers. Such solid-coal equipment represents from 5 to 7% of the total cost of a new generating station, or about $7 per kw for a 500-Mw facility.

The Werner Station trial is the culmination of several years of joint research by the Babcock & Wilcox Co, Consolidation Coal Co and the Texas Eastern Transmission Corp in the bulk transportation of coal by pipeline from mine to power plant.

One of the important technological breakthroughs which made it possible to fire slurry directly in cyclone furnaces without dewatering is an improvement in its coal-water ratio.

The slurry can be fired also in pulverized-coal units, but only after it has passed through a dewatering centrifuge and been pulverized.

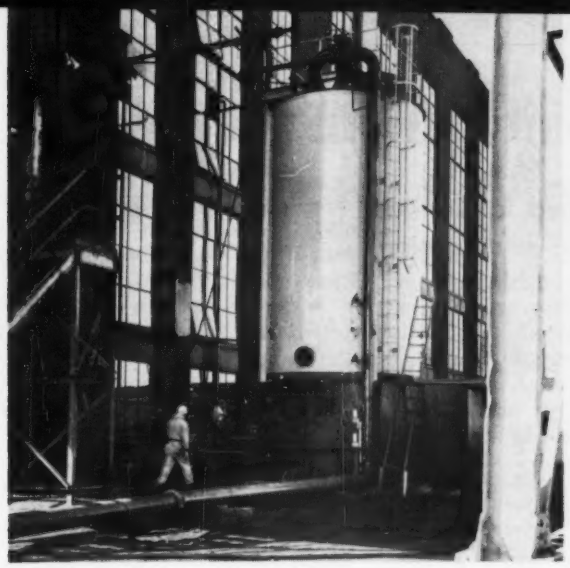
In this new technique, slurry mixture movable through long-distance pipelines has been changed from 50-50 to about 60-40. Also, by means of simple decantation, the coal concentration can be further increased to 70% coal with 30% water. This new slurry has characteristics permitting it to be transshipped and stored in much the same manner as fuel oil. But a 70% slurry is the maximum concentration that can now be handled as a liquid at present.

The slurry to be used in the demonstration at Werner Station was prepared at the Cadiz, Ohio, plant of Consolidation Coal. This slurry, a 60-40 mixture, was moved through Consolidation's 108-mile 10-in. pipeline to storage tanks at Eastlake Plant of Cleveland Electric Illuminating Co. At this point the 60-40 slurry was reduced to a 70-30 concentration, by decanting water from the top of the mixture as it settled in the storage tank. After decantation the slurry was pumped onto barges and moved to Pitt-Consol chemical plant in Newark, N. J., which was used as a slurry storage terminal. From the terminal it was transshipped by barge to Werner Station.

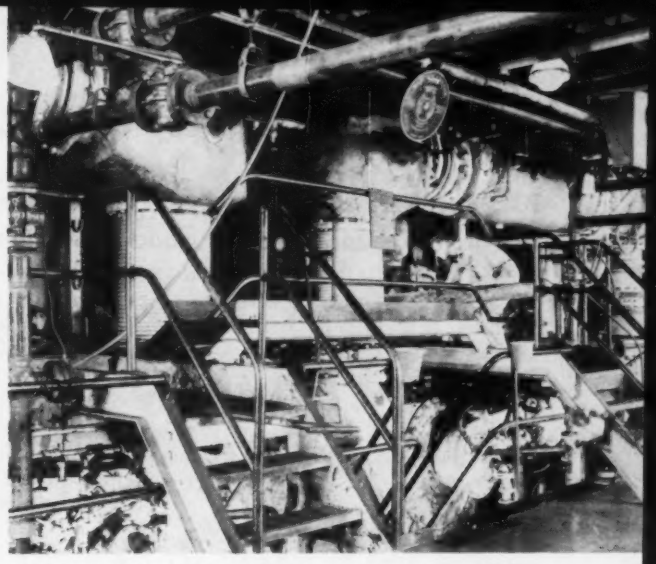
Slurry Burned in Conventional Cyclones

At the generating station slurry is pumped from the barges to oil-type storage tanks without additional processing. When ready for burning the slurry is introduced at low pressure into the front of the cyclone through a simple pipe and stray nozzle that distributes it as a hollow conical spray. Primary air at 700F spins into the furnace from around and behind the nozzle and is immediately followed by hot secondary air in five times the volume at a velocity of about 290 fps. Coal particles are dried, ignited, and burned within 0.01 sec. Flame temperature is over 3,000F.

The high moisture content of the slurry causes some loss in boiler efficiency. When burning slurry boiler efficiency is about 3% less than that when pulverized coal is burned that has an average moisture content of 10% (about 4% below the boiler efficiency when burning dry pulverized coal), according to Neil W. Eft, B&W research engineer. Pound-for-pound, the heating value of slurry is about two-thirds that of dry coal and 45% that of coal. On a gallon-for-gallon basis, its heating value is about two-thirds that of oil. Slurry



SURGE TANK at generating station is for intermediate handling. Lines through window feed slurry to the furnaces



CYCLONE FURNACES at Werner operate on the coal slurry. Two cyclones burning 70-30 slurry are under stairways

with a moisture content of 45% has been burned in a cyclone furnace, Eft said.

John E. Logan, vice president, engineering, operations and generation for Jersey Central P&L, said it is too early to draw conclusions regarding the Werner trials. Results have yet to be studied and consolidated, he said, but indications are that the technique is practicable. Results of the demonstration will include data on boiler efficiency turndown ratio, equipment performance, and stack emission. One surprise of the demonstration was the absence of significant change in the appearance of the plume of exhaust gases leaving the stack.

Two Million Gallons of Slurry to Be Burned

During the trials a total of about 7,200 tons of coal was consumed. This is about 2 million gallons. Plant operations through November 6 are summarized in the accompanying bulletin.

Performance throughout the trial has revived speculation regarding early construction of the long-distance, large-diameter coal pipeline from the coal fields of West Virginia and western Pennsylvania to areas around Philadelphia and New York City, distances up to 350 miles. Construction of the line was proposed in 1959 by Texas Eastern Transmission and Consolidation Coal. As now planned, the pipeline would be 20 to 30 in. in dia and would incorporate a special preparation plant at the supply end and pumping stations along the route. Lateral lines would branch off to plants along the route.

W. T. Thagard, Texas Eastern vice president, said that the cost of the proposed pipeline would be near $100 million. Such a pipeline, he said, takes advantage of the relatively stable cost of coal at the mines and of transportation by pipeline. Consequently the effects of inflation on prices over the years are minimized.

Construction of the East Coast pipeline was said to be contingent on receipt of firm long-time coal contracts aggregating 6 million tons of coal a year more or less, depending on the number of utilities participating and their location.

Consolidation Coal operates the first long-distance coal pipeline; that between its Cadiz facilities and Eastlake Plant of CEI. It is 108 miles long, 10 in. dia, and moves 1.4 million tons of coal per year in slurry form. Built in 1957, the line delivers an average of 160 tons per hr, and last year operated 97½% of the time. The Ohio line delivers coal to a filtering and thermal drying plant which converts the 60-40 to 8% moisture coal for firing, according to Eric H. Reichel, Consolidation Coal. To date about 5 million tons have passed through the line, he said.

Werner Plant Slurry Burning Demonstration
Operations Bulletin
November 10, 1961

First slurry firing started 1:18 A.M., October 18, 1961

Estimated quantities as of this date:

Total hours operated	450
Total power generated, Mwhr	22,318
Average load, Mw	49.6
Total gallons of slurry burned	2,108,000
Tons of coal burned	7,194

Nozzle Size, No. 41 burner 11/16 Inch, ID
No. 42 burner 55/64 Inch, ID

Slurry concentration 68% coal, by weight

Proximate coal analysis, dry

Volatile	Ash	Sulphur	BTU	A.S.T.
40.0	7.45	2.6	13,530	2185°F

Typical screen analysis

8	14	28	48	100	200	325	−325
0.2	5.0	20.0	18.0	13.5	6	6.2	30

Barge unloading time: 7-8 hours for 340,000 gallons

EEI Hears Al Corrosion Debated

T&D speakers at Des Moines clash over need for further research on underground conductors, their deterioration

Research and development with extensive field installations are essential to the full utilization of insulated aluminum underground cables, L. L. Carter, Anaconda, told the Edison Electric Institute Transmission and Distribution Committee recently at Des Moines, Iowa.

The oxide coating of aluminum conductors must be preserved to prevent localized eruptive corrosion, Carter said, adding that the corrosion seems to have no single cause but stems from a combination of contaminants in tapes and insulation, slight electric leakage or charging currents, oxygen deficiency, and the lack of atmospheric action which cleans bare overhead conductors.

Laboratory tests, he said, now point to complete filling between strands to block out moisture and air. But until this or another method has demonstrated its ability to prevent corrosion, insulated aluminum without a sealed metallic sheath cannot be recommended for underground service at any voltage.

Carter's statement was challenged by H. S. Spaulding, Kaiser. In a paper co-authored by W. K. Priestley, he asserted that "a properly designed aluminum cable having the proper components and the right insulating and jacket compounds . . . will do the job as well as . . . a cable with a copper conductor."

Corrosion is the result of chemical reaction between the aluminum and water, forming aluminum hydroxide and free hydrogen, he said. In addition, leakage current in the presence of moisture can cause electrolytic corrosion of the aluminum. But neither type of corrosion occurs except where damaged insulation or improperly sealed splices admit moisture, a condition leading to the ultimate failure of any type of cable.

Spaulding cited the successful operation of 2 million ft of cable at 5 kv and up and "many millions of feet" below 600 v as proof that insulated aluminum gives good service underground. But research meanwhile has developed an inhibitor which polarizes the aluminum conductor's oxide film to make it immune to water. He reported that tests in highly corrosive water, which reacts with uninhibited samples until the water is absorbed, show no evidence of attack on inhibited samples.

R. C. Graham, Alcoa, observed that aluminum-sheathed cables have been protected for years by polyethylene jackets and suggested that all failures of aluminum cable are charged against the aluminum even though copper-conductor cables probably would have failed under the same conditions. T. C. Duncan said Consolidated Edison's 2.5-million ft of aluminum network cable has been trouble free and that the same is true of the company's aluminum-sheathed higher-voltage cable.

Experience with more than 2-million ft of aluminum underground cable has shown that precautions to exclude moisture are essential, said H. L. Davis Jr, Philadelphia Electric Co. Insulation and jacket must be impervious even to osmotic and vapor transfer and must be guarded against damage in installation, he warned.

Philadelphia's aluminum cable ranges from 120/240-v street lighting to 35-kv subtransmission, all direct buried, but trouble has been confined to rubber-Neoprene 600-v cable where insulation damage during or after installation admitted moisture, he said. Copper-conductor cable, subject to the same moisture, would operate for years, he added.

Common Trench Cuts UG Cost

Cable distribution for residential developments today is buried in a common trench with telephone facilities for $164 per lot through close coordination of construction by the two utilities and the developer, said Martell F. Tuntland, Commonwealth Edison. This cost, he said, compares with $110 per lot for conventional overhead plant and permits Commonwealth Edison to offer underground service for a contribution of $50 per lot for developments of 24 or more homes.

Additional economies are anticipated from random occupancy of the joint trench, sanctioned on a limited basis by the Illinois Commerce Commission since July, he suggested. Both utilities are negotiating to enable either one to install the cables and connection pedestals for both services. A proposal now before the commission would permit Commonwealth Edison to install, own, and maintain buried service cable to each house for $1 per ft, he added.

Almost everything has been changed since Commonwealth Edison reported on its residential underground program four years ago, observed Tuntland. The primary cable today is 15-kv, polyethylene-insulated, shielded No. 4 copper inside a concentric stranded neutral, and operating at 12 kv. Secondaries are two 2/0, 3/0, or 4/0 aluminum conductors with a smaller neutral, all in a "ribbon" of polyvinylchloride insulation.

Street Crossings Are Buried

Cables crossing streets are in sand rather than steel conduit, the plan being to replace any cable that fails by pushing a steel conduit and pulling cable through it. Transformer pads have been shifted to undisturbed earth alongside the trench, so that telephone cables need not be looped around power risers, he said.

Illinois Bell Telephone Co provides underground facilities on such developments at no additional charge where subdivisions are laid out and completely built up by a mass-production developer who digs and backfills all trenches, including those for services, said L. A. Kemnitz, Illinois Bell, in a paper coauthored by J. C. Smith, Commonwealth Edison. Where digging and backfilling must be done by the telephone company, however, a charge of $15 per lot is assessed.

Joint study, they said, showed that common trenches should be dug at rear lot lines, cable laid in them, and backfilling completed by utility

(*Continued on page* 94)

Line Design Problems Dominate Fall General Meeting Sessions

- Place of lighting and switching surges in fixing line insulation needs explained
- Revolution in transmission tower design covered in five symposium sessions
- Breakeven costs of peaking and base-load generation weighed. Loss costs studied
- Impedance of lightning stroke calculated
- Ferro-resonance seen as system threat

History will certainly mark the Fall General Meeting, 1961 for distinction. For here, at Detroit on October 20, consolidation of the American Institute of Electrical Engineers and the Institute of Radio Engineers into a single organization, first came under official formal consideration. (EW Oct. 30, 1961, p 52.)

A resolution was presented and approved by AIEE directors on October 20, and by IRE directors October 18, calling on them to endorse the idea, prepare a constitution and bylaws for consideration by the two boards early next year. If approved by the membership of both societies the consolidation of the two institutes into the biggest single engineering society in the world, would become effective January 1963.

Turning to the engineering sessions, transmission's exploding technology provided the bulk of the material of interest to electric utility engineers at the Fall General Meeting. There were six transmission sessions, five of them symposium sessions each devoted to a different aspect of line design; I. Line electrical features, II. Tower structural features, III. Tower foundations, IV. Advanced line design, and V. Conductors.

I. Line Electrical Features

J. M. Clayton, Westinghouse, demonstrated that minimum insulation requirements of lightning-proof transmission lines is determined by lightning considerations up to 345 kv and by switching surges at 500 kv and higher. He showed that the number of insulators required for a line depends on the maximum number required by any one of the three types of over-voltage appearing across line insulation; 60-cycle voltages, switching surges and lightning. In most cases, he said, 60-cycle needs are satisfied by switching and lightning requirements. Clayton suggested insulating 161-kv lines for switching surges of 3 times normal voltage; 230-kv lines and above for 2½ times normal. To find the number of discs required for lightning protection he picked the number of units per string (15) that has given good performance (under 1 outage per 100 miles per year) on 230 kv lines. He adjusted this value for requirements of 60-cycle operating voltage to find the number of units required at higher and lower voltages.

A method of picturing, in advance, the adequacy of radio noise performance of a proposed transmission line design was also introduced. The method was proposed by Messrs. L. O. Barthold, J. Kaminski and J. J. La Forest of General Electric with H. E. House of Alcoa. Their method compares radio signal strength with anticipated foul- and fair-weather radio noise levels and population densities in each of six 100 ft zones paralleling the line. Economics of improving RI performance is balanced against cost of handling complaints in each area. As criteria a signal-to-noise ratio of 40 db was listed as excellent; less than 10 db poor.

RI tests on the 70-mile Sammis-Star 345-kv transmission line of Ohio Edison Co suggest that shield rings have little effect on RI levels of bundle conductor lines. They will not be used on future 345 kv lines by Ohio Edison, R. E. Graham and C. R. Bond reported. The conductor itself was found to be the major cause of foul-weather RI. But since foul weather occurs less than 1.5% of the time in the company's territory, it will not be a factor in future line design. Labor and material savings from elimination of shield rings were estimated to be $120 per single-circuit tower.

What clearances are necessary to protect linemen against switching surge flashover during live-line work? What, if any, is the hazard to linemen in electrostatic shock? Answers to these questions were provided by A. Elek and J. W. Simpson of the Hydro Electric Power Commission of Ontario. Their paper presented a novel formula for computing safe approach distances to live line parts. In general, these were given as 5, 7 and 10 ft for lines of 115, 230 and 345 kv and between 11 and 15½ ft for 460 kv, depending on whether switching surges of 2.3 to 3.2 times normal are anticipated. Electrostatic shocks can be reduced by wearing conductive shoes. Such shocks were described as annoying but harmless.

II. Tower Structural Features

Today's revolution in tower technology was apparent at this symposium. Focus of attention was on the strength and corrosion-resistance of competing structural materials now in use, and the comparative merits of guyed and self-supporting tower designs.

Speaking for steel, S. A. Wilson, Bethlehem Steel Co, observed that with towers increasing in size and voltage, the use of high strength steel has increased accordingly. It is more than ever important, he said, to specify steels carefully to achieve the most economically attractive tower.

J. C. Pohlman, U. S. Steel Co, outlined the properties of high-strength low-alloy steels that offer attractive strength-to-price ratios. Like greater strength, he said, im-

Award Winners at Fall General Meeting

Recognition awards presented by AIEE president W. H. Chase include:

WM. M. HABIRSHAW AWARD to Samuel B. Griscom, advisory engineer, Westinghouse Electric, for accomplishment in transmission and distribution

MORRIS E. LEEDS AWARD to Theodore A. Rich, consulting engineer, General Electric Co, for contributions to the field of electrical measurement

MEDAL IN EE EDUCATION to G. F. Corcoran, professor and chairman of EE, University of Maryland, for excellence in and contributions to teaching

Fall AIEE Sessions Focus

proved corrosion resistance can be purchased for a nominal increase in price.

The case for guyed transmission structures was presented by L. H. J. Cook and B. Cooper, International Power & Engineering Consultants. Their studies showed that, except in mountainous sections, guyed structures offer savings over self-supporting tower for EHV lines in central British Columbia. They listed three virtues of the Vee-type tower over the portal type: **1.** No leg extensions are required, **2.** There is less tower deflection and more stability under broken-guy conditions and **3.** Four guy anchors provide better security than two. Erection tests using a truck crane indicated a 25% saving in assembly and erection time over an equivalent delta tower. However, accurate plumbing of guyed structures was necessary to prevent redistribution of guy loads.

Structure and anchor designs of 345-kv and 138-kv guyed Vee towers now under construction on the American Electric Power System were analyzed by E. S. Zobel. With the guyed structure, he said, costs can be reduced while retaining the reliability of self-supporting structures. Aluminum is competitive with steel in this type structure, he concluded, because of the low L/R ratios in the design. Aluminum is making additional savings possible in erection. But both Corten steel and aluminum holds promise of savings in maintenance, he said.

Zobel called for a new type of lower cost, maintenance-free anchor. And, as a solution to creep he suggested pre-tensioning guys to 15,000 lb or higher and then slacking back to 7,500 lb. Zobel also noted that with Vee towers the clearance from conductor to steel is sometimes small. Flashover may occur to guys; a serious matter if strands are broken.

Some of the differences between guyed and rigid towers must be more deliberately exploited if users are to benefit, H. B. White, Aluminum Co of Canada said. For instance, he said, if advantage is to be taken of time savings in installing guyed-tower footings survey crews trained in precision techniques must be instructed in relaxed standards.

III. Tower Foundations

Two Canadian utility engineers, M. Markowsky and N. J. McMurtrie, Ontario Hydro Electric Power Commission, concluded that tower foundations can be anchored effectively and economically using expansion anchors back-filled with power-tamped crushed rock. Preloading to capacity will minimize creep and ensure reliability within acceptable limitations of uplift. This approach, they said, can be used for guyed towers as well as conventional grillages for rigid type transmission towers, they said.

A novel presentation of special tower foundations, by A. A. Ferito and A. V. Price, Ebasco Services, described a number of recent installations that from the foundation point of view required special design consideration.

IV. Advanced Line Design

Tremendous expansion of cities and metropolitan areas has created a major problem for electric utilities in securing rights-of-way. Nature of these problems were apparent in the results of a survey presented by A. H. Anderson and M. Markowsky, Ontario Hydro-Electric Power Commission. Not only are rights-of-way costly and difficult to obtain, there is difficulty in retaining full control of existing R/W, the survey showed. All 28 utilities replying agreed that the cause was "built up areas limiting property available." High cost of property was given by 82%, and 29% listed refusal of property owners to sell at a reasonable price as a factor. Growing interest in use of railroad R/W for power lines was apparent. Over 70% of respondents are using the side of railroad R/W for lines. Another 21% build lines between tracks and 11% straddling. Half the utilities have bundled conductors to increase capacity of existing lines while 68% re-insulated and raised voltage.

Conductor vibration was another worrysome topic. Fret marks—the small dull marks found on conductor strands where they touch or contact armor rods or clamps—appear to hold a clue to the origin of fatigue failure of conductors. W. G. Fricke

on Exploding Transmission Technology

and C. B. Rawlins, Alcoa Research Labs have found that every failure studied in a recent investigation began with fretting metal parts. Such fretting, caused by small back and forth movements between metal parts, reduces the fatigue strength of strands. They held out some hope of combatting the effect with surface coatings. But permanence of the treatment is still in question.

V. Conductors

A warning was also sounded that inconsistencies in the National Electric Safety Code for heavy and medium loading districts can result in under-designed transmission structures particularly with large conductors. R. L. Retallack, American Electric Power Service Co, said these variations arise from the requirement of NESC that ice and wind loads be considered to occur simultaneously. Retallack pointed out that under ½ in. and ¼ in. radial ice, unit wind loads do not increase proportionately with conductor diameter, but at a lesser rate that reduces the margin of safety. Comparison of equivalent ultimate wind loads offers a means of analyzing all combinations of wind loads and safety factors, regardless of ice loading assumptions, Retallack said.

Sharing this dim view of NESC wind loadings, N. J. McMurtrie, Ontario Hydro pointed out that for all larger conductor sizes (over 0.8 in) the heavy loading condition is less severe than the light. He urged designers to use care in specifying supplementary wind loads for larger conductors. Designers could profitably use the abundant experimental wind pressure data from Europe to determine net effective wind pressure on conductors, he said.

Planners Study Generation and Loss Costs

The concept of buying generating capacity to fit the need at a particular time and at an economical combination of long-range capital and operating costs is the basis of five related digital computer programs used by Philadelphia Electric Co. R. J. Fitzpatrick and J. W. Gallagher explained that two of the programs use annual load-duration curves to produce a family of new generation requirements curves. These feed into other programs which develop real expansion patterns and associated costs.

This concept has been applied with good results by Cleveland Electric Illuminating Co, according to R. C. Craft. Three new factors will be included in CEI's program: Availability factors that reflect scheduled and forced outages; selection of lowest-fixed-cost unit from among various-sized units having the same variable costs; and a peaking unit expansion pattern based on constant reliability and comparison with base-load expansion pattern.

Development of the breakeven cost of peaking capacity with new base-load generation prompted F. M. Heck, Jr, and Charles Morrison, both of Potomac Edison Co, to conclude:

1. Moderately-high peaking-energy cost is insignificant for reasonable amounts of peaking capacity, **2.** Peaking capacity is more attractive if new base-load heat rates are only moderately better than average system heat rates, **3.** Peaking capacity will be more atractive on a system having a low average fuel price for conventional units, **4.** Upper incremental costs of older base-load units, and average production costs of cycled thermal units are most susceptible to error or manipulation. The significance of this is easily obscured by some analytical methods.

Taking another look at demand cost of losses through use of simulation and present-worth techniques, C. J. Baldwin, Westinghouse Electric Corp, and C. H. Hoffman and P. H. Jeynes, both of Public Service Electric & Gas Co, suggested using a varying discount, of less than 50% of the pro-rata cost, for both generation and transmission, depending on the amount of loss and generation expansion pattern anticipated. They said also that an estimate of pro-rata cost to supply very small incremental loads is impossible to defend. Also they found a zero incremental demand cost difficult to defend except for very small incremental loads or very-large-unit expansion patterns.

Through study of retirement problems in generation expansion planning, these same authors concluded that percentage revenue requirements change little as plant life varies from 35 to 65 years. In general, lowest present worth of all future revenue requirements is obtained by keeping old plants in service. Optimum retirement data is an insensitive function of fixed operation and maintenance expenses, it was stated.

A form and explanatory manual for gathering outage data to help in planning generating additions was presented for industry use on behalf of the Subcommittee on Application of Probability Methods by H. A. Adler, Commonwealth Edison Co, and E. S. Loane, General Public Utilities Corp. The new reporting scheme, they said, is as simple as the subject matter permits, should constitute an original record and lends itself to analysis by digital computers. Information covers not only general outage rates but also a variety of detail important for capacity planning in the form required by known methods of probability application.

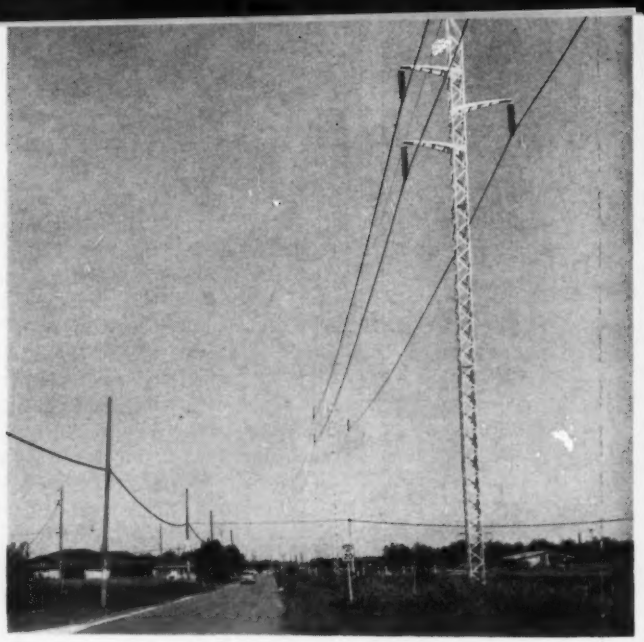
Advances Foreseen in MHD and Fuel Cells

Significant advancement in MHD generation was hinted at by S. Way, Westinghouse Electric Corp. "We see a means of reducing the temperature of the conducting gas, and also a new material, which has withstood wall temperatures of 2,460C and an 800 meter per sec gas flow for 93 hr," he said. "In addition,

(*Continued on page* 87)

Build Good Looks Into 115-Kv Line For Built-Up Urban Area

Louisiana utility uses lattice and welded-aluminum poles with pre-stressed concrete foundations and compressed ACSR conductors in lines designed for urban streets and winds up to 140 mph



SQUARE LATTICE POLES of welded aluminum use extruded members and are factory assembled. Stand 140-mph wind

H. L. DELONEY, Assistant Chief Engineer, Louisiana Power & Light Co, New Orleans, La.

Two new 115-kv transmission lines of Louisiana Power & Light Co were designed especially for urban streets in built-up areas and those expected to be built up in the near future. Anticipated loads indicated that these lines should be designed to feed substations where loads would be 70,000 to 200,000 kva with distribution circuits underbuilt on the same poles.

Lines traversing such areas had to have an attractive over-all appearance and, in this part of the country, must withstand hurricane winds of 140 mph with a 1.5 safety factor. The lines required conductors in the 1¼-in.-dia class, yet had to have a minimum diameter for a given conductivity to minimize wind loading in a hurricane. Very poor soil conditions required pole foundations 54 in. in dia and up to 32 ft deep.

Investigations were begun five years ago into ways of meeting the growing load and rapid build-up of the area. The company was presented with the usual present-day alternatives—either development of a publicly acceptable, reliable overhead line design, or putting a large amount of transmission underground. The first choice would cost only 10% of what the underground construction would involve.

Accordingly, the new transmission lines were designed for narrow ground-line dimensions, 20 to 24 in, to permit installation between sidewalk and curb. Poles were designed to withstand the loadings of two circuits, one on each side in a vertical configuration, and able to support a single circuit on one side to minimize property overhang and afford safe clearance to tall buildings. These poles had also to accommodate a single 115-kv line in triangular configuration and support spans 300 to 600 ft.

Designed for 140-Mph Wind

With designs based on 140-mph wind loadings, the loadings were calculated at 19 lb per sq ft on round surfaces and 30 lb per sq ft on flat surfaces, with a correction factor for pole configuration. Pole heights are 80 to 95 ft in 5-ft increments.

Crossarms are of an upswept design, conductors supported 6 ft, 9 in. from the face of the pole. Arms on the same side of the pole are spaced 11 ft, 6 in. apart. All arms are self-supported, without braces, to improve the appearance and minimize insulator-swing clearance problems.

Distribution primary arms will be similar in appearance to the transmission arms. Although distribution circuits have not been installed as yet, poles are designed to carry one phase conductor of the distribution primaries on one side and two phase conductors on the other.

Overhead shield wires are attached at the top of the pole, 9 ft above the top arm of the 115-kv circuit.

Poles were designed for universal usage, the same type pole serving as a tangent or angle structure by the addition of guying attachments and guys.

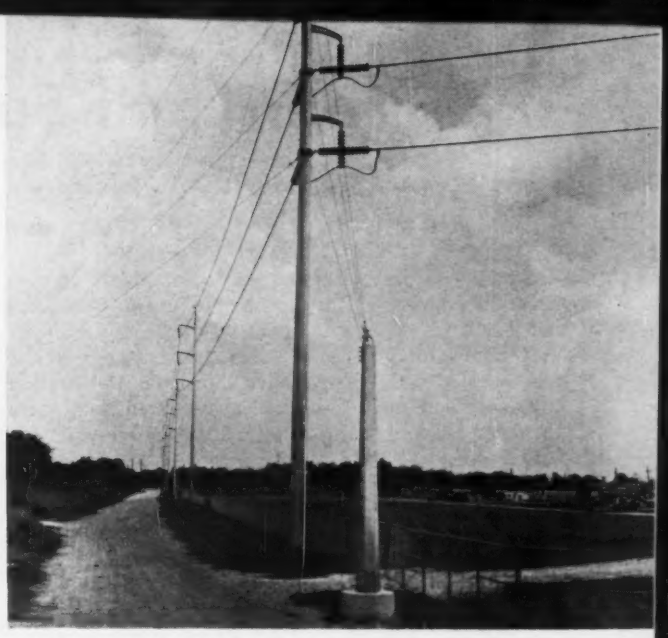
Guy stubs are of the same basic design as those for line structures. They are capable of working loads of up to 36,000 lb applied horizontally, 20 ft above ground. Such guying avoids congestion at the ground line and improves appearance.

Poles were designed to withstand a working load moment of 400,000 lb at the ground line with a safety factor of 1.5 on yield of the structure. This design permits universal use of the pole for the configurations and wind loads anticipated. Examples of circuit arrangements visualized are:

1. Single 115-kv circuit, vertical configuration with 1¼-in.-dia conductors and a 140-mph wind loading. Allowable span is 600 ft.

2. A single 115-kv circuit with vertical configuration and 1¼-in.-dia conductors plus one 3-phase primary circuit underbuild. Allowable span is 410 ft.

TAPERED OCTAGONAL POLES of welded aluminum are hollow. Top section is square and tapers to 9 in. on a side



DEAD END AND GUY STUB structures use tapered pole components. Latticed dead-end and guy stubs are similar.

3. Double-circuit 115-kv line with vertical configuration, one circuit on each side of pole, 1¼-in.-dia conductors and 140-mph wind loading. Allowable span is 325 ft.

Six general approaches were considered. Two designs met the major requirements and appeared to be economically most feasible. These were an all-aluminum, lattice type welded pole known as the Alrectic lattice pole, and an all-aluminum, tapered, hollow type of welded pole, with the lower portion octagonal and the upper portion square in shape. The latter is known as the Alrectic Oct-O-Quad pole.

Poles Developed Jointly

These poles were developed jointly by Louisiana P&L, Handley Brown Corp (now Alrectic Division, McGraw Edison Co), and Olin-Mathieson Chemical Corp. Before construction, full-scale poles were tested at the factory.

The latticed-type pole is non-tapering and 2-ft square in cross-section throughout. Such poles are completely assembled at the factory by welding. Specially designed extruded chord members are used. These members permit directional design and are adapted for inserts that permit varying the section modulus in increments as required by moments at different points along the pole. The design makes maximum use of the metal and maintains an attractive pole exterior.

The true octagon at the base of the tapered hollow pole is 22 in., face to face, each side 9 in. The pole tapers to a 9-in. square near the top crossarm and continues to a spire for the 8 ft to the top. These poles have four uniform-dimensioned faces which act as load-bearing members. They are extruded to allow inserts for varying section modulus in each direction. The four remaining faces are tapered for the sake of improved appearance and to carry the shear forces between the chords. Design features make it versatile as to length and road requirements without altering appearance, base or top dimensions.

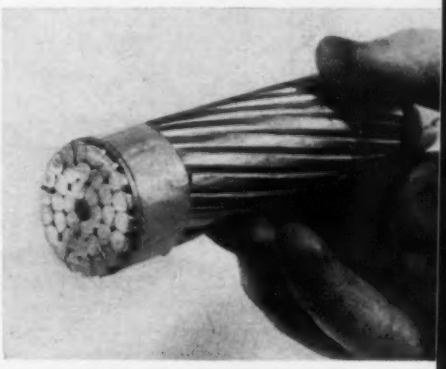
By varying the angle of taper of the four tapered sides, any desired height can be obtained up to more than 100 ft. By varying the location and thickness of inserts on the load-bearing faces, loading characteristics can be obtained ranging from light loading to hurricane conditions.

By efficient use of the aluminum in the designs, pole weights have been kept to 20 to 25% of the weights of equivalent steel poles. When reduced erection costs and the lower maintenance expenses are taken into account, the premium for aluminum structures is small and more than offset by public approval of the appearance.

In keeping with the general appearance of the aluminum towers, insulators of a light blue shade were used. Louisiana P&L's standard 10-in. disc insulator is brown. However light blue was selected to blend with the sky and the color of the aluminum.

The new lines have special conductors, designed for maximum conductivity at minimum wind loading. Several manufacturers were asked about the feasibility of producing a 1,468-MCM ACSR in a compressed form. Although this type of conductor had not been produced in such a large size, Olin Conductors

(*Continued on page* 100)



COMPRESSED ACSR conductor is 1,468 MCM with 36/1 stranding but has only 1.288 in. diameter for minimum wind exposure

Street-Light Surveys Sell Towns on

ROBERT H. CHASE, Engineer, General Engineering Dept, Hartford Electric Light Co, Wethersfield, Conn.

Street light surveys presented to municipal officials have proved to be effective promoters in Hartford Electric Light Co territory. Street lighting improvements and enthusiasm of the town fathers in the 16 towns thus far provided with surveys have shown the preparation time spent on them was well invested. In fact, more than 100 miles of streets in these towns are now illuminated to full ASA-IES Code standards as a result of these surveys, which are prepared in brochure form.

In many smaller Connecticut towns and cities, inadequate street lighting has often been installed in the past in a haphazard manner. One primary reason is the lack of an easy method for determining a town's lighting requirements. Preparing these easily understood engineering brochures has not been a difficult task, for a simple and logical procedure has been followed.

Illumination levels recommended, based on the Street Lighting Code of the American Standards Association and the Illuminating Engineering Society, depend on the volume of vehicular and pedestrian traffic. As the volume increases, the seeing task becomes more difficult and confusing and higher levels are needed for good visibility. The ASA-IES Code classifies vehicular traffic according to Fig 1.

The first step in preparing a survey is the accumulation of traffic-density information. In Connecticut, the State Highway Dept and town engineering departments have traffic counts for the important streets in town. Most of the other streets can be classified by comparing their traffic to the known traffic-bearing streets.

Or take your own traffic count quickly. Count the traffic that passes a point in both directions for six

	Vehicular Traffic			
Pedestrian Traffic	Very Light 0-150	Light 150-500	Medium 500-1200	Heavy 1200 up
Heavy	—	0.8	1.0	1.2
Medium	—	0.6	0.8	1.0
Light	0.2	0.4	0.6	0.8

FIG 1—ASA-IES CODE for street lights recommends these intensities in foot-candles

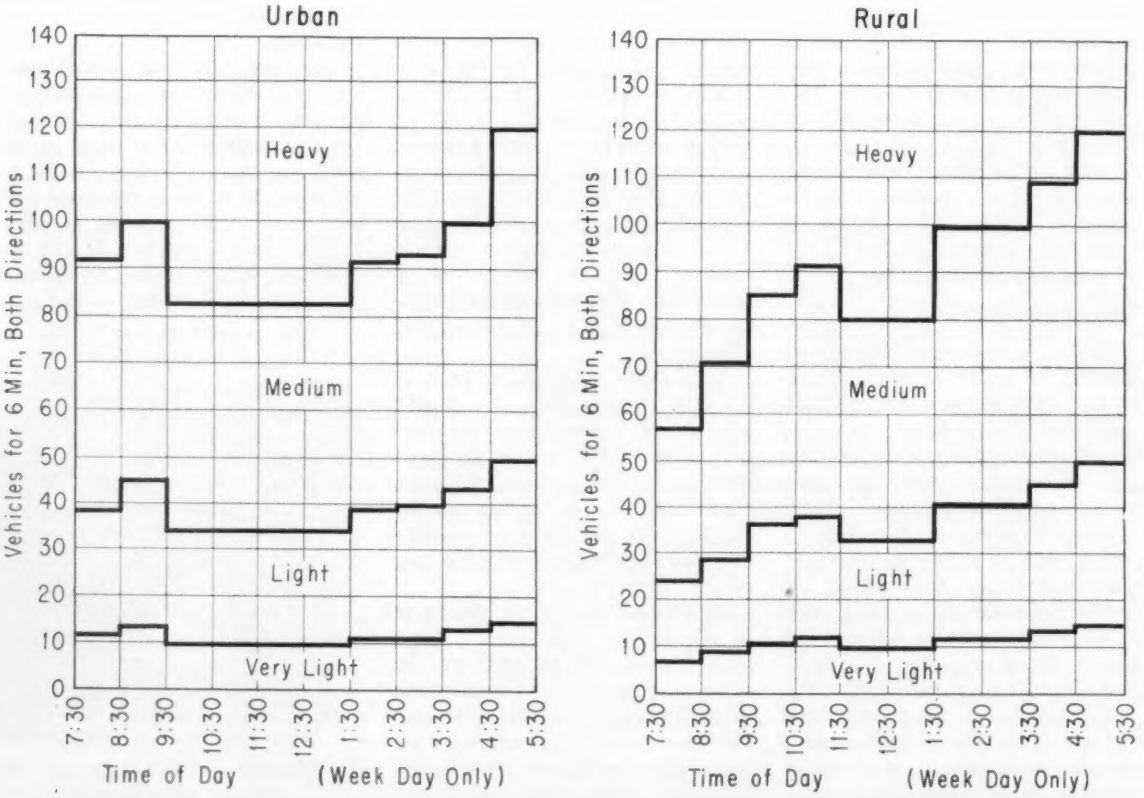


FIG 2—TRAFFIC COUNT charts for urban and rural streets show the classification of a street on the basis of 6-min traffic counts taken during daylight hours during an average weekday. Schools, factories pose special cases

Code Lighting

minutes. Then, depending on whether the street is urban or rural and on the time of day the count was taken, consult Fig 2 for the proper street classification.

These urban and rural charts were prepared from published curves that show the percentage of 24-hr daily traffic for an average week day. Care should be exercised in using this table. If the street has a traffic signal, count the traffic for two full cycles of the signal. If the time duration is not 6 min, prorate the count to a 6-min basis. If there is a factory or a school in the area, try not to take the count around the time the shifts are changing or when the school lets out.

A point to remember is that we are not concerned with making an accurate traffic count, but only with the classification of the street. It doesn't matter whether the maximum count is 650 vehicles per maximum night hour or 850 because both of these are between 500 and 1,200, in the medium vehicular classification. If there is a doubt as to the classification, accept the higher one. In Connecticut, traffic volume is increasing at 8-12% per year, so that in a few years a street would probably be in the higher classification anyway.

These charts are set up for daytime use because it is convenient to classify many miles of streets during regular working hours only. Later, when a town decides to light a street, its traffic density can be analyzed at night, if need be, and the street light recommendations adjusted.

Pedestrian Traffic Included

Once the traffic information has been gathered, the streets can be coded according to traffic densities and shown on a town map. It is a good idea to include copies of these maps in the street light report as they may also prove useful to municipal officials planning projects other than street lighting.

The pedestrian use of the streets can usually be determined in accordance with the business use of the area surrounding the streets. Main business areas are usually classified as heavy pedestrian, while secondary business areas and industrial areas might be medium pedestrian. Rural and strictly residential areas are light pedestrian. Town zoning maps are sometimes helpful for determining the business use and pedestrian densities of the streets.

From the vehicular traffic densities and pedestrian uses of the streets, the illumination levels are determined in accordance with the ASA-IES Code and plotted on a town map, such as that shown as Fig 3.

Next, the number and size of light sources are determined for each street to supply the required illumination. The levels in Fig 1 are the average foot-candles maintained in service. The Code further states that the lowest foot-candle value at any point on the pavement should not be less than one-fourth the average value. The only exception applies to roadways carrying very light vehicular traffic where the lowest value may be as low as one-tenth the average value.

A modern street light fixture with an average utility-pole spacing generally supplies an average-to-minimum illumination ratio of less than four to one, while a

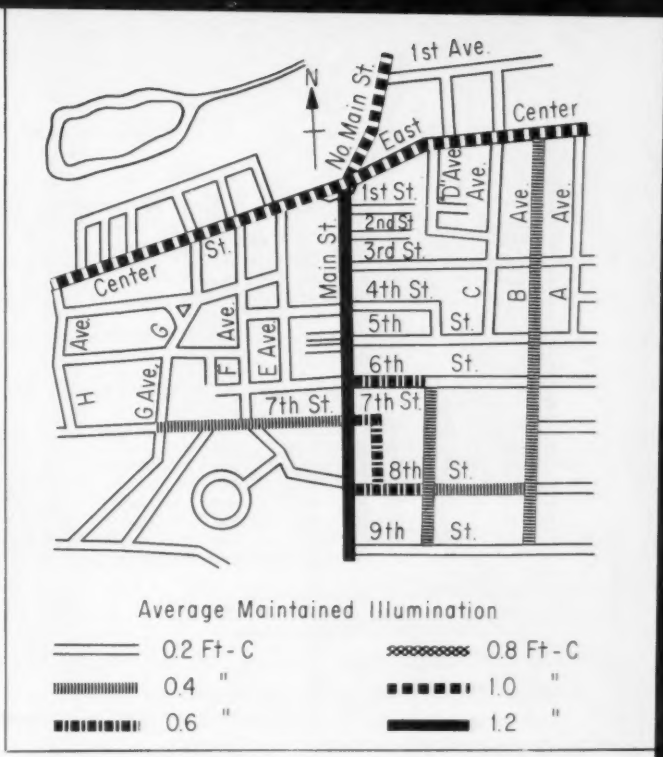


FIG 3—ILLUMINATION LEVELS recommended for a Connecticut town are shown in this map made for one of the surveys. Another map in report showed accident rates

properly designed street light fixture on every other pole supplies a uniformity of about ten to one. In other words, any street with 150 vehicles per maximum night hour or more will need a light on every utility pole regardless of the illumination level required. The recommended level can be supplied more by the selection of the size and type of light source than by varying the spacing. A simple way, therefore, to establish the number of lights required on a street is to count poles, providing the pole spacing is fairly constant.

We would not suggest this method for making a street light layout. After the town shows an interest in lighting a street, we would then determine where the lights should be installed according to good street lighting practice. If there is not a pole where a street light ought to be, then we would set a pole. But for a survey, counting poles is satisfactory for determining the number of lights required.

To provide Code levels, we usually recommend the following: 20,000-lumen clear mercury vapor fixture for installations with more than 0.8 ft-c; 10,000-lumen incandescent lamp on an every-utility-pole spacing (100-150 ft) for 0.6 ft-c; 6,000-lumen incandescent on every pole for 0.4 ft-c; and 2,500-lumen incandescent source for the lower lighting levels. These provide the most economical uniform lighting under our present street light rates. Other fixtures may be more economical for another utility with a different rate structure.

In the larger towns, traffic-accident information is also included in the survey reports. Accident records are usually compiled by local town police departments, which are cooperative and willing to share their records

Table I—Cost of Lighting Streets

Street	From	To	Vehicle Use	Pedestrian Use	Recommended Ft-C Level	Size of Lights, Lumens	Approx. No. of Lights	Increase in Annual Operation Cost	Accidents 1-1-60 to 12-31-60 Day	Accidents 1-1-60 to 12-31-60 Night	% of Recommended Illumination Existing Now
Main	9th	Center	Heavy	Heavy	1.2	20,000	50	$4,000	20	8	25%
Intersec.	Main & Center		Heavy	Heavy	1.2	20,000	20	$1,975	10	12	35%
Total of Above For Relighting Main Business Streets								$5,875			
Center	"H"	Main	Heavy	Medium	1.0	20,000	30	$2,500	11	4	15%
Center	Main	"A"	Heavy	Medium	1.0	20,000	20	$1,500	7	5	15%
No Main	Center	1st	Heavy	Medium	1.0	20,000	10	$750	..	..	20%
Total of Above For Relighting Heavy Traffic Streets								$4,750			
6th	Main	"D"	Light	Medium	0.6	10,000	7	$300	..	..	20%
7th	Main	8th	Light	Medium	0.6	10,000	13	$525	..	..	35%
8th	Main	"D"	Light	Medium	0.6	10,000	7	$300	2	0	20%
8th	"D"	"B"	Light	Light	0.4	6,000	7	$250	..	..	15%
"D"	9th	6th	Light	Light	0.4	6,000	15	$600	3	0	10%
"B"	Center	9th	Light	Light	0.4	6,000	40	$1,500	2	7	15%
7th	Main	"G"	Light	Light	0.2	6,000	10	$600	..	..	20%
Total of Above For Relighting Light Traffic Streets								$4,075			
Residential Streets—½ Code Lighting					0.1	2,500	250	$5,000			32%
Additional Amounts to Bring Residential Streets to Full Code Lighting					0.2	2,500	250	$6,250			50%

HEART OF REPORT to city officials is above table showing lighting needs individually for each street with more than 150 vehicles per night hour. Very-light-load streets are grouped at bottom for half and full Code lighting in steps

for a study like this. Accident information is accumulated for an entire year. The location of each accident is noted along with the time of occurence, whether during daylight or at night. The numbers of day and night accidents are also listed for each section of street in the cost-of-lighting table of the report (Table I).

Even though the primary reason for street lighting is to reduce night accidents, the accident record does not affect the amount of illumination recommended. The accident experience does point out where relighting is needed the most and what streets should be relighted first. Usually a street carries one-third as much traffic after dark as during daylight. In the city of Hartford, we have reduced the night accident rate to one-third the day rate by relighting Hartford's streets to Code illumination levels.

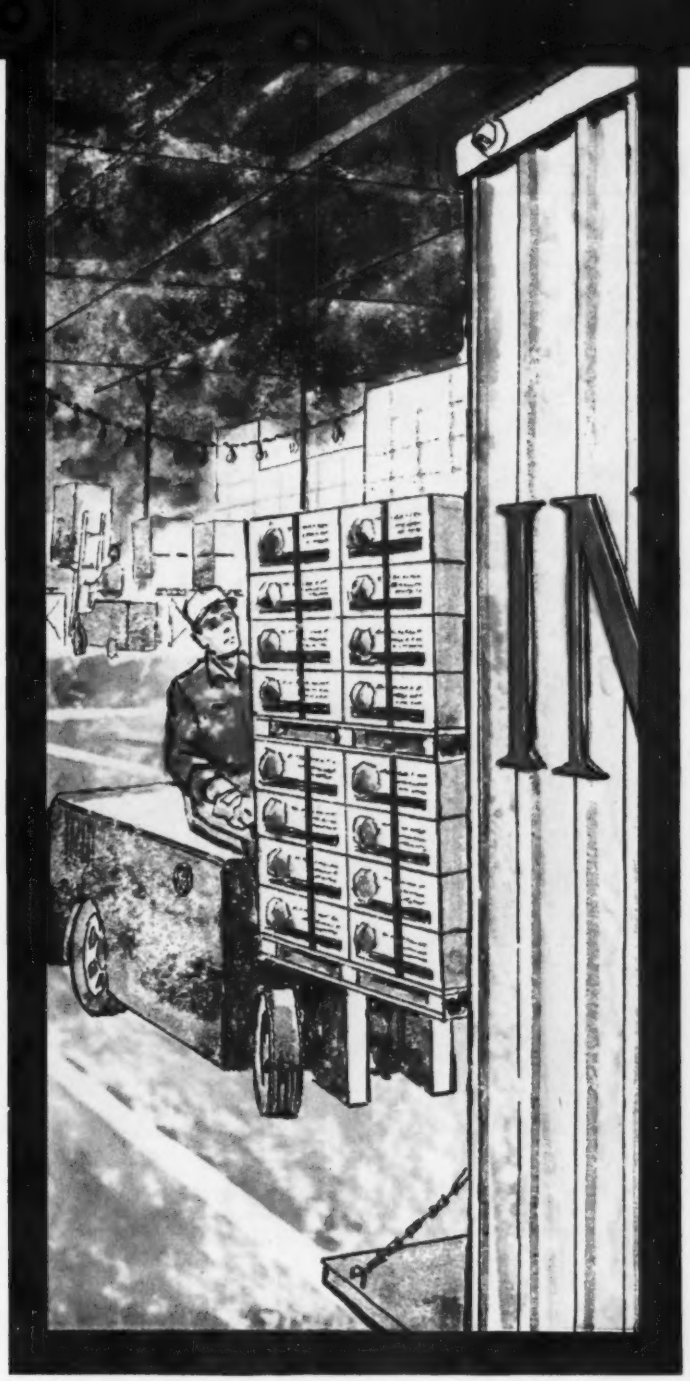
The above information can now be assembled in a table for inclusion in the report (Table I). This table is the very heart of the report. It shows the lighting needs individually for each street with more than 150 vehicles per night hour and collectively the lighting needs of all streets with less than 150 vehicles per night hour. At the end of the table, the very light traffic streets are grouped together. First, the number of lights and the approximate increase in annual operating cost is shown for half Code lighting: 0.1 ft-c, 2,500-lumen light on every-other-pole spacing. Finally, the annual operating expense and the number of additional lights to achieve full Code lighting are shown.

(*Continued on page* 100)

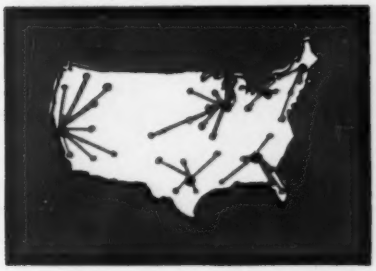
Table II—Expenditures for Various Stages of the Street Light Plan

Total Area of Town—3.5 Square Miles
Total Miles of Streets—17 Miles
1960 Population—6,500

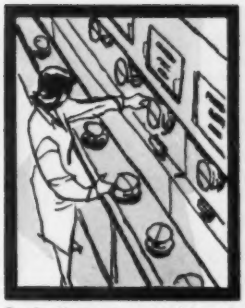
	Present Lighting System	Main St. Business Area Code Lighting	Heavy Traffic Streets Code Lighting	All Traffic Streets Code Lighting	All Traffic Streets Code Lighting Plus ½ Code on Residential Streets	All Streets Code Lighting
Total Number of Lights	190	225	270	325	475	725
Total Number of Lamp Lumens	650,000	1,750,000	2,790,000	3,350,000	3,780,000	4,400,000
Average Spacing in Feet	475	400	335	276	190	115
Miles of Code Lighting	0	0.8	1.8	4.2	4.2	17
Increase in Annual Operating Cost for New Lighting	.....	$5,875	$4,750	$4,075	$5,000	$6,250
Total Annual Cost for Street Lighting	$6,500	$12,375	$17,125	$21,200	$26,200	$32,450
Street Lighting Cost per Capita	$1.00	$1.90	$.65	$3.25	$4.00	$5.00



41 strategically located warehouses



Computers speed telegraphic punched-tape processing



Production programmed to orders

ANOTHER GENERAL ELECTRIC METERING EXTRA . . .

Overnight delivery from 41 local warehouses

To help you cut metering equipment inventory costs, keep stocks balanced, General Electric's standard high-volume meters, sockets and instrument transformers are available for immediate delivery from 41 stock points in G-E's unique "Jet Stream Service" warehouse system.

New Jet Stream advances mean even faster delivery. For example: single-phase demand meters and transformer-rated single-phase meters not warehouse-stocked are now shipped in only five working days, cut from four weeks. And, polyphase meters are shipped in just six working days.

Here's how Jet Stream Service keeps local stocks of G-E's high-quality metering products available for your needs. Daily, punched-tape reports on sales in each of the 41 warehouses (regional and local) are telegraphed to the factory. By computer processing, the factory (1) directs replenishment of local warehouse stocks from six regional stocks, (2) replenishes regional stocks, and (3) programs production to meet current needs. General Electric's program of best service, plus superior products, adds up to your best metering buy. Get the full story—product and service—from your G-E Sales Engineer. 713-09

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- Certified Quality
- Meter Courses
- Low Cost per KVA
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- Industry Communication
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GENERAL ELECTRIC

Contactor Controls 480-V Street Lights

R. J. McCOY, Engineer, System Distribution Eng'g, Florida Power Corp, St. Petersburg, Fla.

For a more economical street lighting system, Florida Power Corp has used 480-v multiple systems to serve 400-w mercury vapor white ways because:

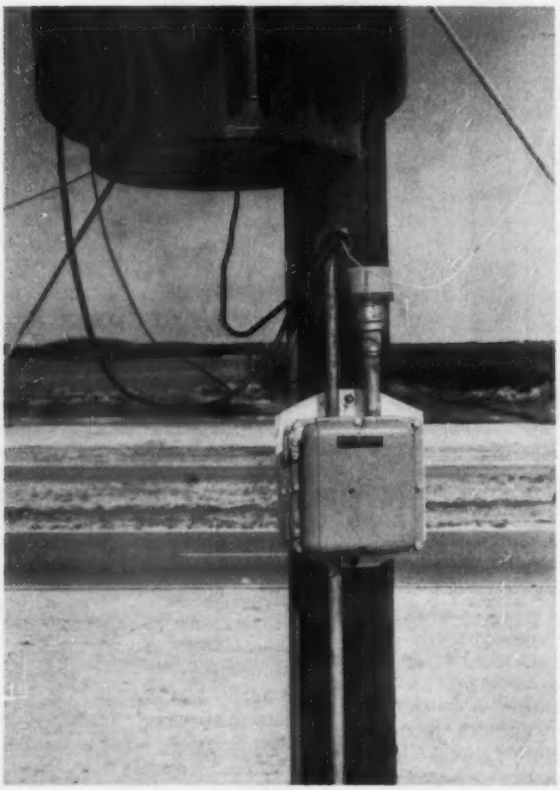
- Where regulator-type ballasts are used, proper voltage can be maintained over No. 6 copper approximately a half mile in each direction from the transformer.
- Standard 600-v cable can be used in the street light bracket and for short drops to poles not in the main line.
- Since the circuit operates at less than 600 volts, it can be installed in the secondary position.

Until recently, these 480-v systems have been controlled by a remote control oil switch on the primary side of the transformer. The switch was controlled by a 120-v photoelectric cell energized from another source of power.

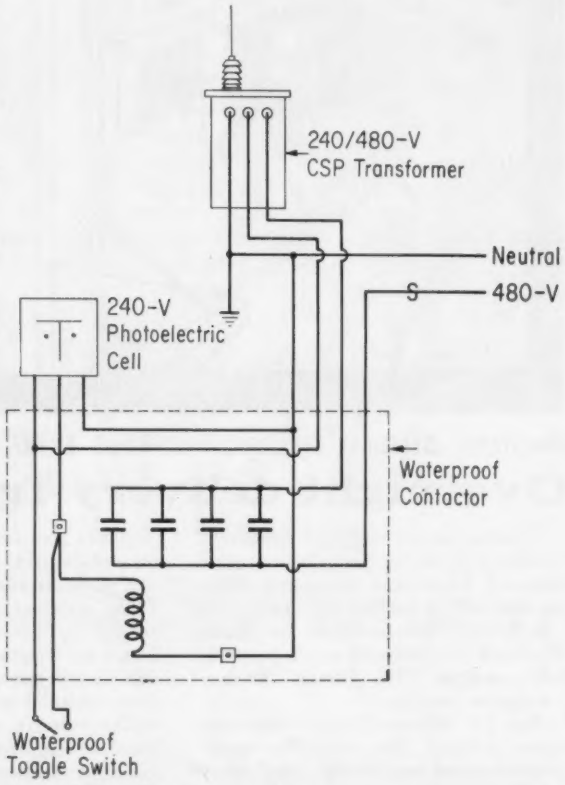
This was an excellent but expensive system, especially expensive when the installation was made where there was no other 120-v source available. It did have the advantage of leaving the street light transformer de-energized during the daylight hours.

To reduce the expense on installations of this type, the street light circuit is controlled by a contactor, which is operated on the 480-v side of the same transformer which serves the street lights. The contactor is actuated by a 240-v photoelectric cell energized from the mid-tap and one side of the secondary of the 480-v transformer.

This arrangement eliminates the need for a separate power source, usually provided by a special transformer, to operate the photoelectric cell. The installation also costs less to install and operate than a primary oil switch. Preliminary figures indicate that when fixed charges and losses on the energized transformer are considered, a net savings of $11.80 annually is realized.



240-V PHOTOCELL that taps mid-point of 480-v transformer controls contactor to operate 480-v street light circuit



ARRANGEMENT with waterproof contactor replaced scheme with oil switch. Saving is estimated at $11.80 annually

Professor C. T. Maney, right, and graduate assistant C. G. Collins run tests with Circle cable at University of Kentucky.

Circle's cooperation in university research programs means...

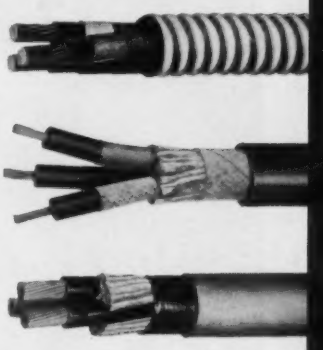
CABLE THAT MEETS TOMORROW'S NEEDS

Electrical engineering research programs being conducted in colleges and universities are vital to the continued progress of our industry.

Circle Wire & Cable is glad to cooperate fully with the universities to help assure the success of their projects. Circle has supplied reels of cable on a loan basis to a number of colleges engaged in the development of basic data on the behavior of cable under unusual conditions. At the University of Kentucky, for example, tests are being conducted, using Circle multiconductor cable, to develop basic data on skin effect and proximity effect on cable operated at 400 to 600 cps, 3 phase loading.

The results of these University of Kentucky tests and other basic research data developed in university laboratories contribute significantly to better cable design. This is the goal we continually strive for at Circle.

Specify Circle cable on your next job ...there's no finer cable made.



CIRCLE WIRE & CABLE CORP.

SUBSIDIARY OF **CERRO CORPORATION**

PLANTS: Maspeth and Hicksville, N. Y. **SALES OFFICES & WAREHOUSES:** In all principal cities.

RUBBER COVERED WIRE & CABLE • VARNISHED CAMBRIC CABLE • PLASTIC INSULATED CABLE • NEOPRENE SHEATHED CABLE • CIRTUBE* EMT

Wet flashover values increased 20% by electrostatic rain deflectors on Lapp Station Posts

As operating voltages increase, heights of station insulators increase correspondingly. And as heights of insulator stacks go up, the tendency increases for lower insulators to flood under heavy rain conditions.

A Lapp development (Lapp Patent No. 2884479) is the electrostatic rain deflector. This is a metal plate located at each bolted joint between component insulators. It uses the electrostatic field surrounding the insulator to disperse the water as it flows down from the upper portion of the insulator, throwing it outward and eliminating flooding over the lower portion. In tests, Station Posts with the electrostatic rain deflectors show 20% increase in wet flashover characteristics over Posts without these devices.

In addition, design of these deflectors cooperates ideally with the principle of Lapp Fog Type leakage surfaces. Small in diameter, the rain deflectors permit insulator surfaces to be wetted all over without imposing dry shielded areas where leakage current can quickly cause sparking; yet under rain will prevent excess flow of contaminated water over lower sections.

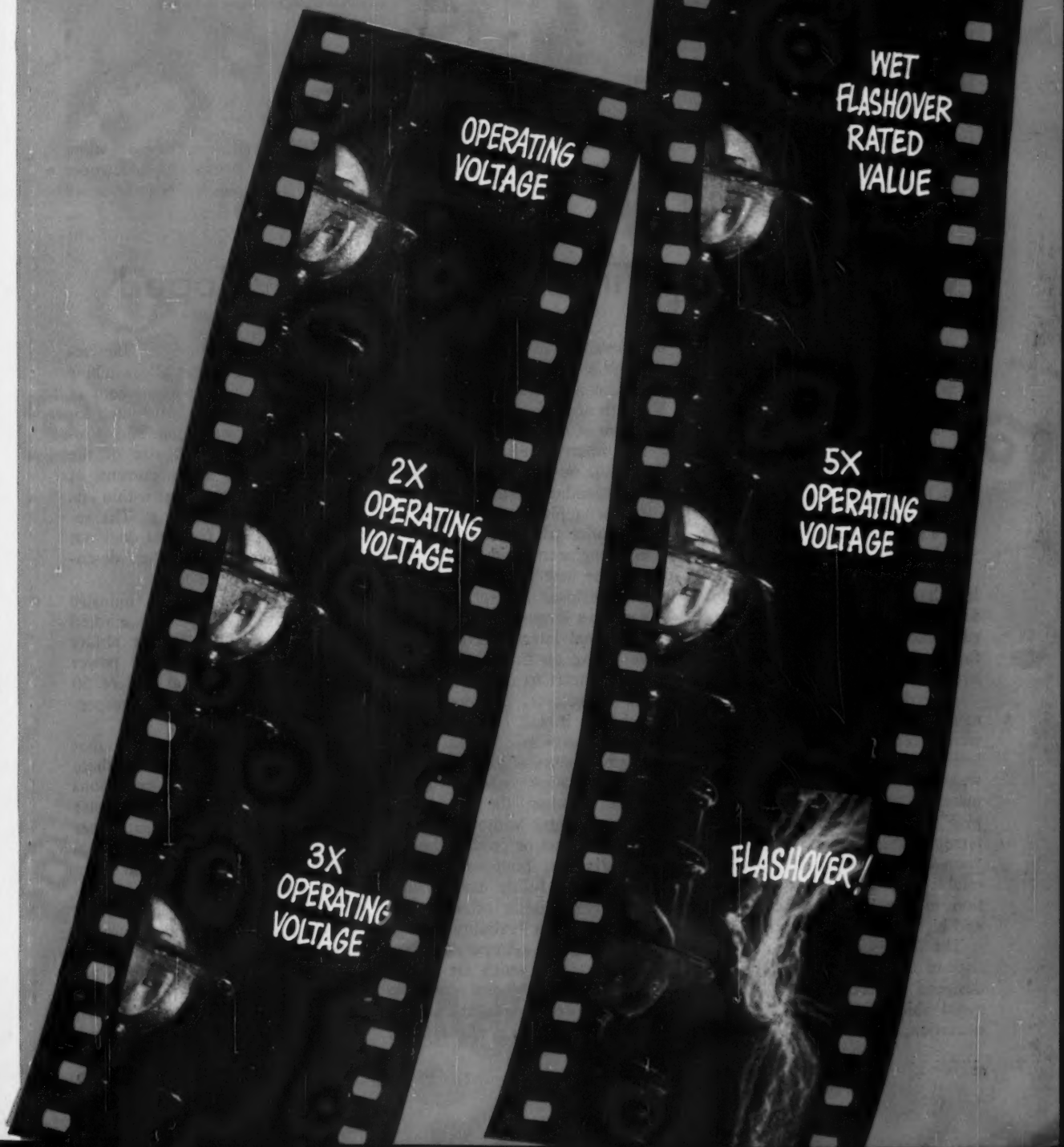
For all high-voltage, EHV, and contemplated EHV, Lapp Station Posts offer superiorities in rigidity, ease and simplicity of construction, adaptability for use inverted or horizontally, operation under dirt conditions, and dependable long life. Units (with Lapp electrostatic rain deflectors at *every* bolted connection) are available in three strength classes at ratings of 900 BIL, 1050 BIL; in two strength classes at 1300 BIL, 1470 BIL, 1640 BIL, 1800 BIL and 2100 BIL. Write for Lapp Brochure No. 548—a critical examination of station insulators for high-voltage application.

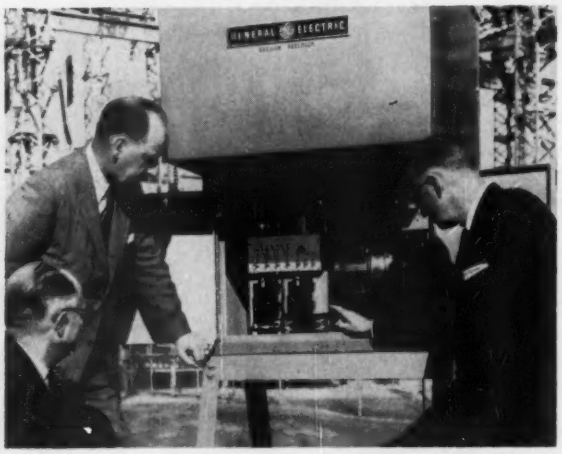
Lapp Insulator Co., Inc., Le Roy, N. Y.

Lapp

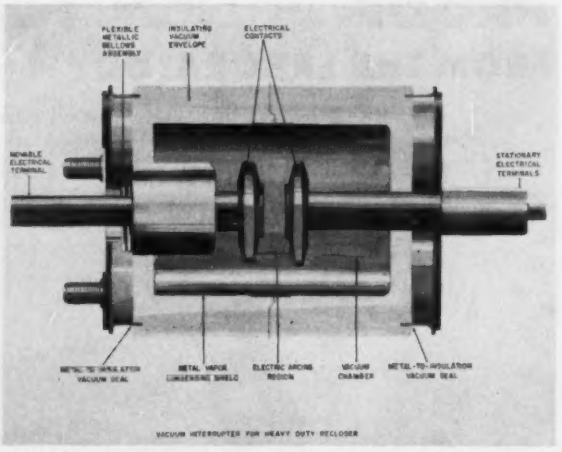
PROOF
FROM THE LABORATORY

This 1050 BIL (230 kv operating rating) Lapp Station Post was photographed through a telescope at 25 kv intervals through buildup of 60-cycle voltage to flashover. The frames selected are at multiples of operating voltage, and show how water is thrown off by electrostatic force.





MANAGER OF SWITCHGEAR LABORATORY OPERATIONS, Vern L. Cox (right) points out solid-state features of fault-sensing unit of new vacuum-type power circuit recloser



CURRENT IS INTERRUPTED by extinguishing the metal-vapor arc produced upon separation of contacts. Metallic vapor disperses from the arc and condenses on metallic shield

'Vacuum' Power Circuit Recloser Developed

A unique high-current circuit recloser to interrupt power arcs in vacuum has been developed by the General Electric Co.

With a rated interrupting capacity of 8,000 amp at 15.5 kv and 12,000 amp at 4.8 kv, the new vacuum recloser is said to mark the first step toward providing utilities with a complete line of oil-less high-speed circuit breakers.

The recloser's clearing time is less than two cycles, including fault sensing, tripping and circuit interruption. It is believed to be the fastest heavy-duty circuit recloser available today.

According to Dr C. G. Suits' statement, four major breakthroughs were necessary to develop a vacuum interrupter for high current. These were: developing suitably de-gassed materials, solving "current chopping" normally associated with interruption in vacuum; producing "non-welding" contact materials; establishing interrupter configurations to meet high dielectric strength and high-current interrupting needs.

The recloser's interrupter consists of a pair of metallic contacts designed to produce arc rotation, a metal shield for metal-vapor condensation, and a bellows to permit the movement of one of the contacts through a half-inch stroke . . . all sealed in a vacuum of below one-billionth of atmospheric pressure or 10^{-6} mm of mercury.

The interrupter contains nothing flammable or toxic and, since it has no surrounding insulating fluid to filter or replace, down-time for maintenance will be reduced.

GE engineers said that service life of the new vacuum interrupter of the recloser is expected to be many times longer than that of any conventional interrupter of comparable rating on the market today. Based on tests to date of the new vacuum recloser, engineers estimated that it will need inspection only one-fourth as often as present style equipments of its class. Further, foundation costs will be reduced because the high-speed recloser operates without any appreciable impact or ground shock.

Featuring a fault-sensing unit employing solid-state components, the vacuum recloser offers exceptional application flexibility through a wide selection of operating and timing sequences which are adjustable in the field by choice of various combinations of plug-in units.

In addition to its application for short-circuit interruption, the recloser is said to meet all switching functions required in equipment of its class. It is particularly suited for capacitor-bank switching, and is insensitive, both to the size of the bank and to the inrush currents of back-to-back switching within its continuous current rating. The recloser is re-strike free and does not produce over-voltages when de-energizing a capacitive load.

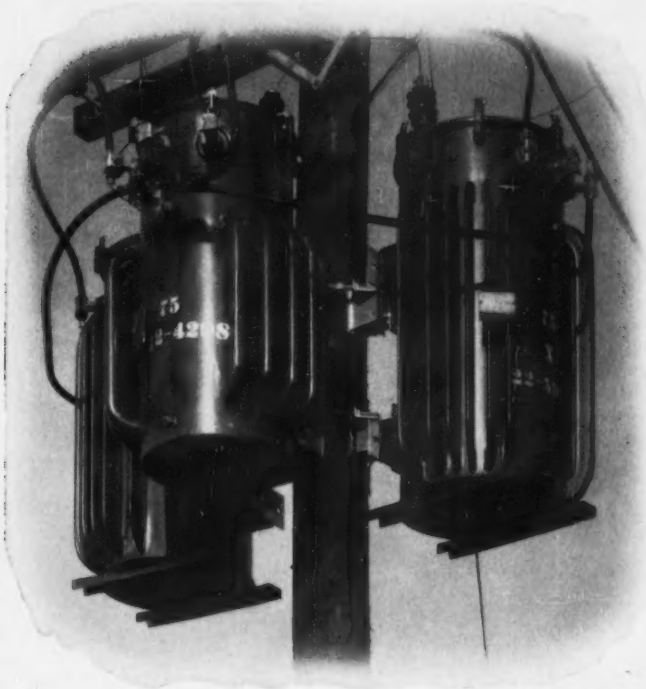
In accordance with industry standards, the recloser has a rated continuous current-carrying ability of 560 amp, and a rated power frequency and impulse level of 50 kv rms and 110 kv BIL, respectively.

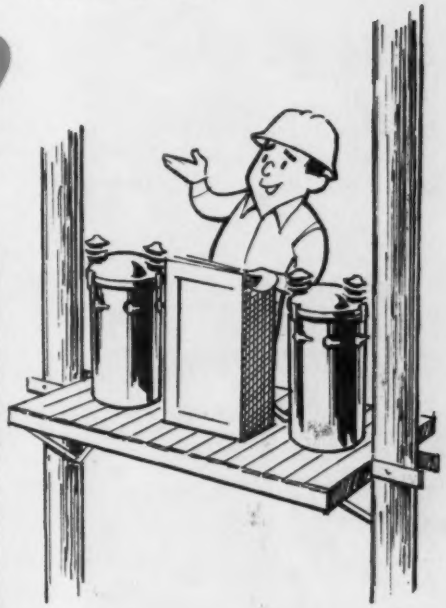
Company officials revealed that research investigations indicate there are no known technical limitations on extending vacuum interrupter technology. They said that other experimental versions of the vacuum interrupter have cleared more than 40,000 amp at 15.5 kv, repeatedly.

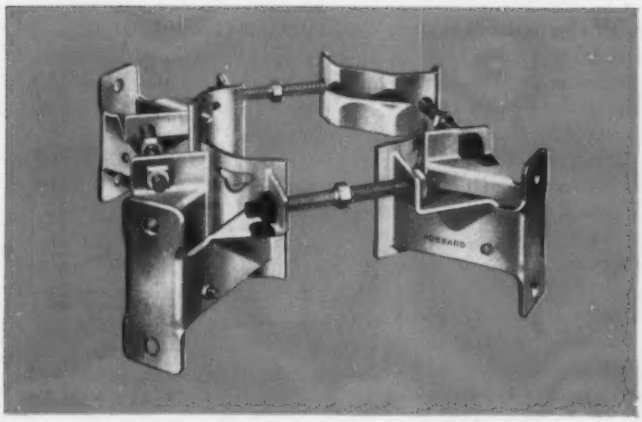
Delivery of the new units from the company's high voltage switchgear department in Philadelphia will begin in the third-quarter of 1962.

(*More News of Manufacturers, p.* 70)

ARE YOU A PARTY WITH A PLATFORM?







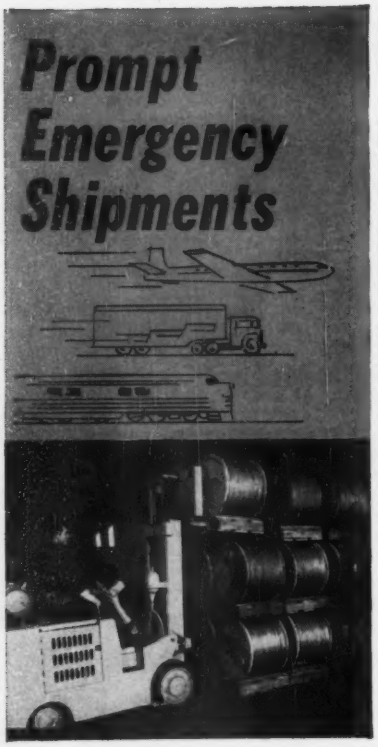
If so, you will want to investigate Hubmounts, the practical mounting method for one to three transformers on a single pole. Hubmounts eliminate the costly, bulky, two pole platform installations with a substantial saving in materials, labor and time. Any size transformers are accommodated up to three 167 kva and the new higher kva light weight types recently developed.

One man can, in a few minutes, attach the necessary supports for one to three transformers. Even for sizes normally hung on crossarms, Hubmounts are quicker and safer.

So if you are a "party with a platform", you will appreciate the difference Hubmounts can make. For full particulars write for Bulletin H-360, Hubbard and Company, Advertising Department, Box 61, Lyons, Illinois.

BETTER PRODUCTS *through Creative Engineering*

HUBBARD AND COMPANY
CHICAGO 50, ILLINOIS



Crapo
GALVANIZED
STEEL STRAND

When in need of guy or messenger strand during an emergency, be sure to contact the nearest distributor of ***Crapo*** Galvanized Strand! Substantial stocks are maintained at strategic distributing points throughout the country ready for immediate delivery. Back of these stocks are our own extensive mill stocks of finished strand, and strand in process. If your jobber does not have all of your requirements, he knows he can depend upon us for immediate shipment of popular sizes and grades by air, truck or rail.

You, in turn, can rely upon ***Crapo*** Galvanized Steel Strand, at all times, to give you the utmost in performance at reasonable cost.

Crapo Galvanized Steel Strand is manufactured in all standard sizes and grades and in three weights of coating: Class A, B and C.

Phone the distributor of *Crapo* Galvanized Steel Strand near you the next time you need strand.

INDIANA
Steel & Wire Co., Inc.
Muncie, Indiana

Line Material Seeks Capacitor Standards

Line Material Industries, McGraw-Edison Co, reports that because of customer preference it is retaining the 15⅝-in. mounting dimension for its new 100-kvar power-factor correction capacitor. Thus, the new units become completely interchangeable, unit for unit, with standard 50 and 25-kvar units in most equipments. This feature enables uprating, rather than obsoleting, present-day equipments.

Available in nominal voltage ratings of 2,400 to 4,800 v in the 75-kv BIL class and 6,640 to 14,400 v in the 95-kv BIL class, L-M's new units exhibit a 30% weight reduction over previous designs. New tank dimensions are 6½x13½ in., with a 25¼-in. height.

Designated Form 2, the new L-M 100-kvar unit features (1) liquid circulation for coolest operation and extended life and (2) improved pack design for increased margin of safety.

Standard mounting dimensions for 100-kvar capacitors is one of the subjects on the agenda at the annual NEMA conference, the week of November 27, in Washington, D. C.

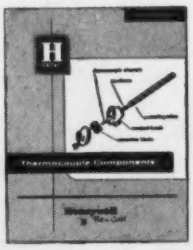
MANUFACTURERS BRIEFS

• **Burndy Corp** is demonstrating a broad range of products developed by its Utility-Industrial Division on seven display trailers which are touring throughout the country to utility and REA customers and prospects. A compact display of connectors and tools are featured; also, collapsible poles can be erected and fitted with cable to permit actual on-the-line demonstration of these products.

• **RT&E Corp** has built an 8,500-sq-ft plant addition in Waukesha, Wis., for exclusive manufacture and testing of single-phase and 3-phase Terra-Trans up to 1.5 Mva. Terra-Tran is RT&E's ground-level transformer for underground distribution. Increased sales of this transformer, says the company, made necessary the special facility and also provision for quick expansion to as much as 15 times its present size.

THERMOCOUPLE
COMPONENTS

Wires, insulators, protecting tubes, heads, blocks, connectors and miscellaneous components—supplied in countless combinations, for highest possible accuracy in any given application. Thermocouple components are among many thousands of accessories—all available from a single dependable source—that can help your instruments perform at their very best.



Get complete details from your nearby Honeywell field engineer, or write today for Catalog G100-3.

MINNEAPOLIS-HONEYWELL, Wayne and Windrim Avenues, Philadelphia 44, Pa. In Canada, Honeywell Controls, Ltd., Toronto 17, Ontario.

Honeywell
First in Control
SINCE 1906

TURBINES:

Shell reveals three ways that Turbo Oils help prevent oil breakdown, rust, sludge and foaming

Small quantities of air and water can work their way into any turbine lubrication system. These contaminants can accelerate oxidation of the oil.

Read how Shell scientists developed a specific formulation that counters this oxidation and brings you turbine lubricating oils with top performance records.

WHEN oxygen attacks turbine oil, it can form peroxides and organic acids. A chain of oxidation reactions begins. If the oil stability is inadequate, sludge can form.

Air entrained in the oil can aggravate oxidation. And it may cause foaming.

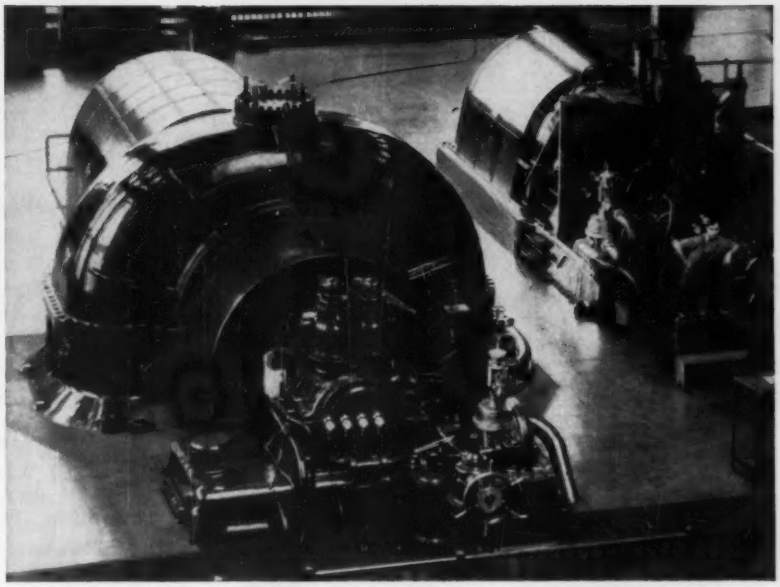
The oil may also be affected by water in the system. Laboratory tests have shown that water can greatly accelerate an oxidation process.

With Shell Turbo® Oil, Shell tackles these problems in three key ways:

1. *Shell carefully selects base oils for use as turbine lubricants,* then refines them to get the most effective response to Shell's special additives.

2. *Shell adds a powerful oxidation inhibitor to its precisely refined base oils.* This inhibitor helps prevent the chain of oxidation reactions caused by oxygen exposure at operating temperatures. It helps keep the oil in good condition, and lengthens its service life.

The result is that Shell Turbo Oils have proved themselves unusually stable over long service periods.



Shell Turbo Oils lubricate turbines with total rating of more than 17 million kw in the U. S. and Canada.

3. *Shell uses an outstanding rust inhibitor.* As a protective measure, Shell uses special additives that cover metallic surfaces with strongly adherent polar-type films.

These films are specially designed to help keep water from the metal surface.

In drastically accelerated laboratory tests, metals immersed in Shell Turbo Oils show outstanding anti-rust performance—even in the presence of sea water.

Ask your Shell Industrial Products Representative for facts on Shell Turbo Oils. Or write: Shell Oil Company, 50 West 50th Street, New York 20, New York.

Memo to utilities

Ten turbines in the U. S. have been running on Shell Turbo Oil 27 *since 1938.*

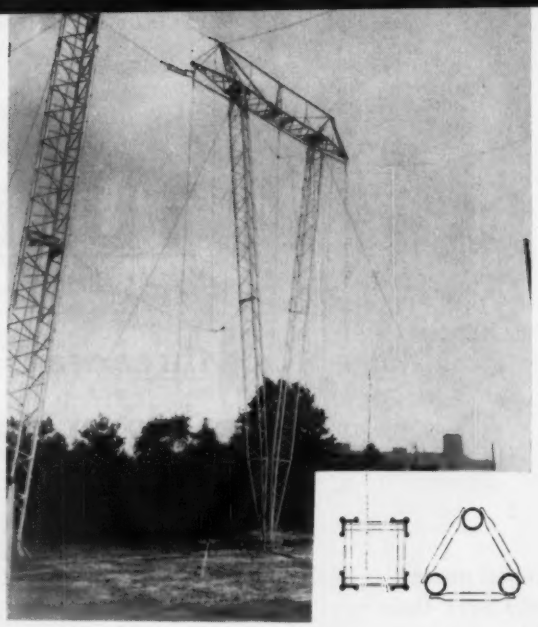
In Canada, Shell Turbo Oils lubricate turbines generating more than half of all steam power produced.

SHELL

A BULLETIN FROM SHELL
—where 1,997 scientists are working to provide better products for industry

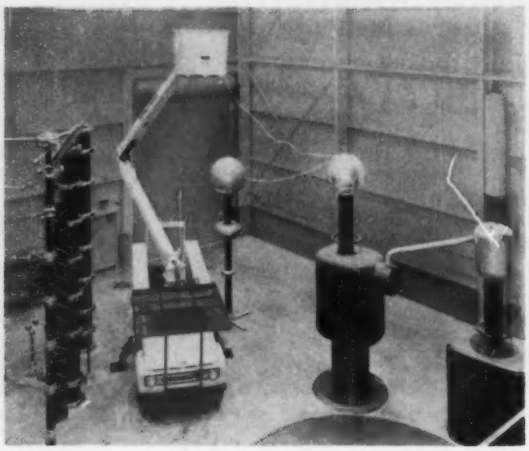
New Equipment

Al Transmission Tower . . .



. . . **of new-type, guyed "V" construction** achieves economical joining of extruded aluminum tubing. The company's engineers have developed a tower design which uses, for leg construction, extruded tubular sections rather than extruded angles, also triangular rather than square cross sections. Advantages of these features are said to be 20% weight reduction and 25% reduction in the number of pieces in the tower, as compared with other aluminum-designed towers of the same strength. Reportedly, the tubular-section design is stronger and more efficient than the angle design.

Michael Flynn Mfg Co, 700 E Godfrey Ave, Philadelphia, Pa.



Fiberglas Boom . . .

. . . **protects basket crews** working on or near electrical transmission and distribution lines. The die-molded Fiberglas boom is available on a full line of Ottawa Strato-Towers with working heights from 35 to 104 ft. It is said to offer outstanding structural strength because of an exclusive double "U" section construction, and also to have superior dielectric qualities. The length of pure Fiberglas boom ranges from 11 ft, 9 in. to 17 ft, 9 in., depending upon the height of the tower. The lower end of the boom is steel, covered with Fiberglas. Two ft of the steel section contain 46 1¼-in.-dia holes with Fiberglas on both sides, fused through the holes to provide a firm bond between the Fiberglas boom and steel section.

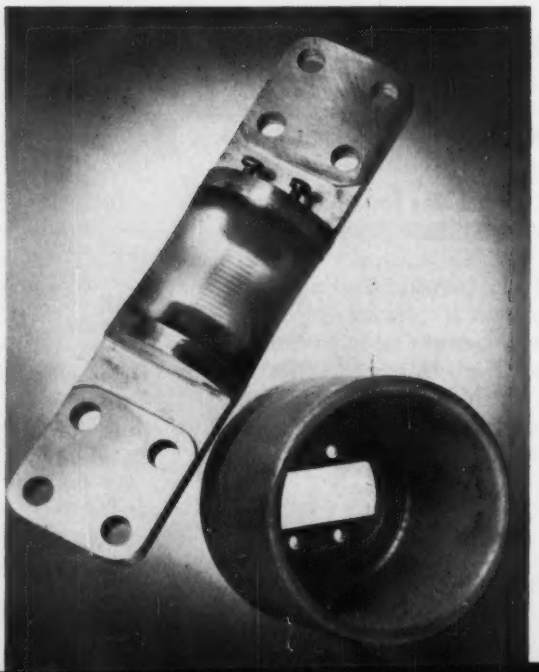
Young Spring & Wire Corp, Bowling Green, Ohio

Disconnect Link . . .

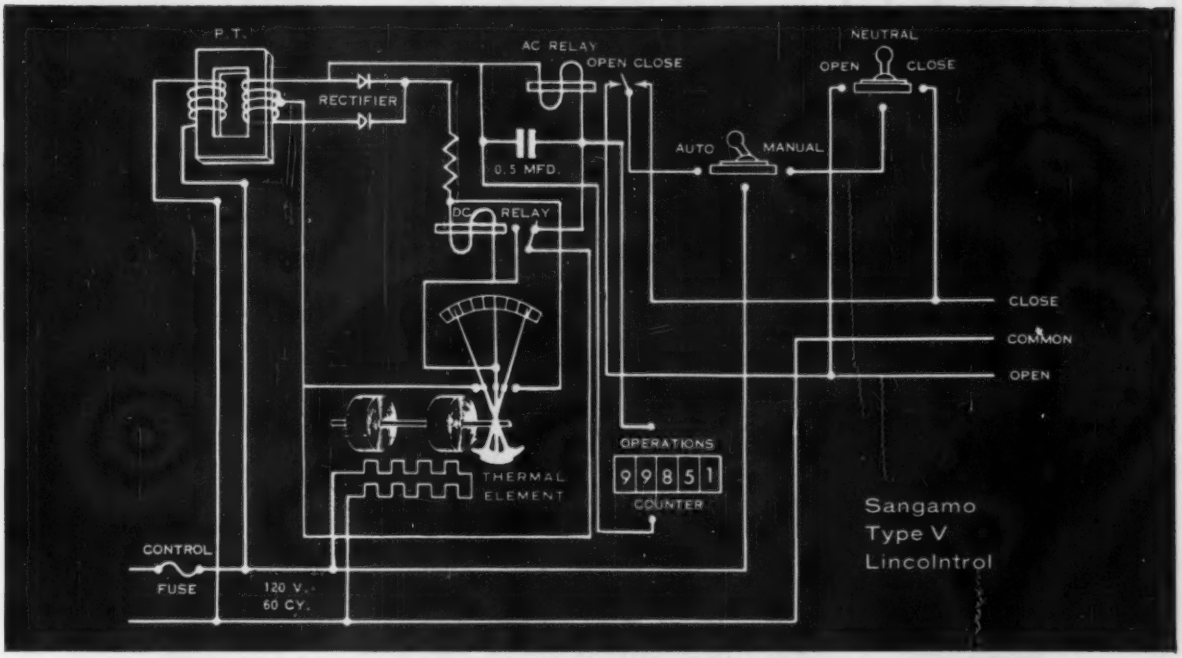
. . . **for faulted equipment** protects potential transformers and coupling capacitors at voltages from 115 to 230 kv. The High Voltage Expulsion Link is reportedly free from ionization deterioration at the highest voltages, has great mechanical strength so that insulator supports are not required, and is said to be an almost instantaneous disconnect means. When fault current flows through the link, it separates, thereby disconnecting the faulted equipment from the bus or line. An air gap is established between the faulted equipment and the voltage source by the separation of the link, so that reclosure of the circuit breaker results in restoration of service on the balance of the system. The link's installations requires only connection between bus or line and the equipment to be isolated after fault.

Powerdyne Inc, 17150 S W Boones Ferry Rd, Lake Oswego, Ore.

(*More New Equipment, page* 74)



GET BETTER CAPACITOR CONTROL WITH THERMAL METER SENSING

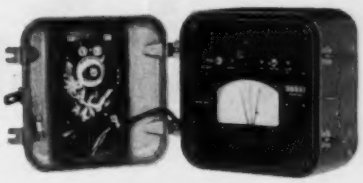


Use high-quality low-cost Sangamo Capacitor Controls

Here is the circuitry of the voltage sensitive Sangamo Type V Lincolntrol . . . one of the instruments that make up the industry's most complete line of power capacitor controls. Switch capacitors as a function of voltage, current, watts, vars, temperature, time. Switch capacitors on the basis of a combination of these functions, or switch in sequence. Switch surely, automatically, any way you choose . . . to provide the greatest benefit for your system. Write for bulletin 1142.

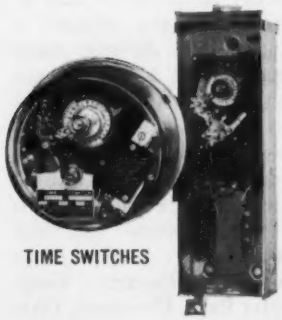
SANGAMO LINCOLNTROL

THE SANGAMO LINCOLNTROL, with its thermal meter signal relay element, inherent time-lag characteristic, and calibrated scale, is ideal for automatic switching based on an electrical quantity (volts, amps, watts, vars).



COMBINATION CONTROLS

SANGAMO COMBINATION CONTROLS let you switch on the basis of time-temperature, voltage-time, voltage-current; any number of combinations for specific requirements.

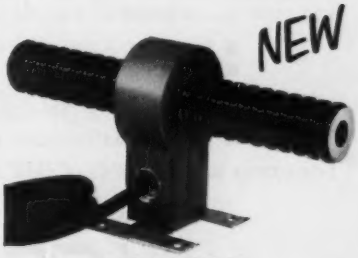


TIME SWITCHES

SANGAMO TIME SWITCHES provide automatic switching on predetermined time schedules. Synchronous carryover, omitting devices and other features make them extremely useful.

NEW . . . HIGH VOLTAGE CT

Great partner for your capacitor controls: the Sangamo V-150 High Voltage Current Transformer that combines 15 kv capabilities with low cost and 2% accuracy. Available with 200:5 and 100:5 ratios.



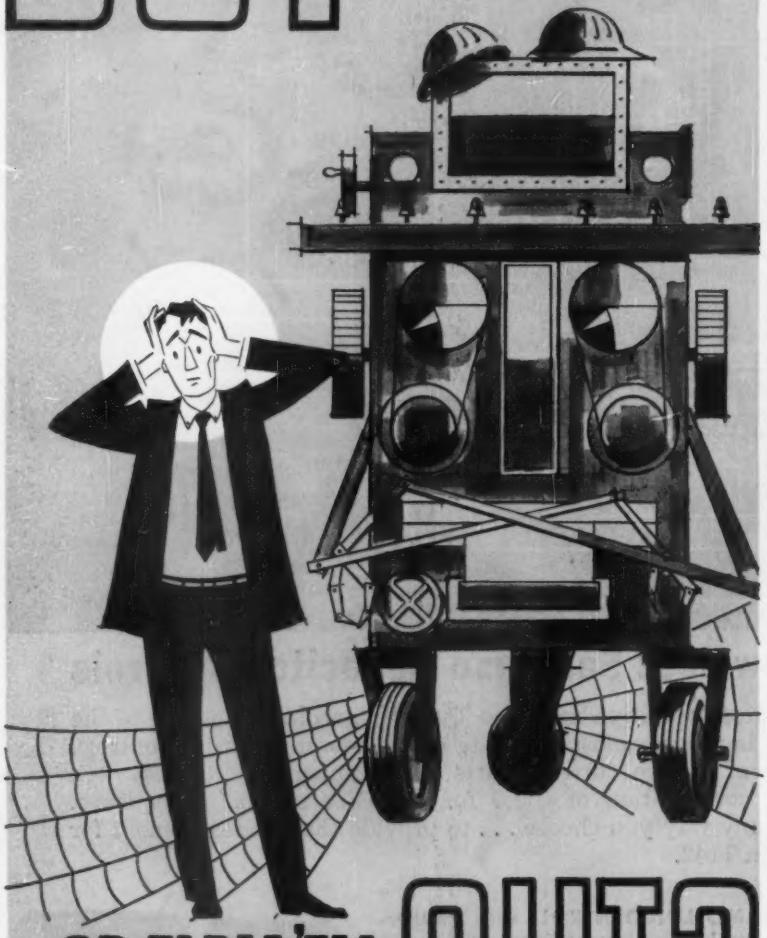
HIGH VOLTAGE CT

SANGAMO ELECTRIC COMPANY

SPRINGFIELD, ILLINOIS

PC61-3

BUY HEADACHES?



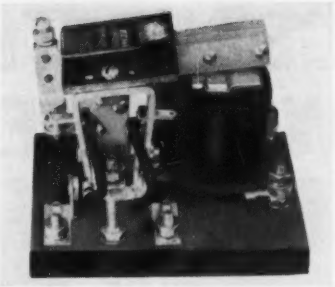
...OR FARM 'EM OUT?

Your job's generating and transmitting electricity, not house-keeping for equipment you can't keep busy full time. Avoid headaches. Call in a qualified electrical contractor. He offers—

- Equipment and skilled men *when and where needed*
- Extra facilities in emergencies
- Reliable job completion dates
- Firm bids on job costs
- Written performance guarantees

For names and addresses of NECA qualified contractors near you, write
National Electrical Contractors Association
610 Ring Building, Washington 6, D.C.

NECA



Relays, Contactors . . .

. . . four 30-amp, multi-pole, for non-inductive loads, are suitable for electric heating and lighting. The special-purpose units feature quiet operation, wiping contacts, laminated frame operators and high contact pressure. They are contact-rated at 30 amp, 250 v ac, and may be applied continuously up to their full rating, open or enclosed, with only conservative temperature rises occuring.

Automatic Switch Co, Florham Park, N. J.

Luminaire . . .

. . . has open-bottom refractor which permits relamping and cleaning without unlatching or removing the reflector assembly. Quadro-liner takes incandescent or mercury lamps up to 250 w. Each section of the refractor is available in five designs; many combinations for a lighting pattern can be made to match almost any roadway lighting requirements. Annoying "spill" light can be controlled and wasted light eliminated. Photocontrol is available to operate the unit automatically.

Westinghouse Electric Corp, Edgewater Park, Cleveland, Ohio

Get ready for winter now

with Bethlehem Strand

Service interruptions were frequent and costly in many areas last winter. Snow and ice, broken limbs, and falling trees caused great damage to conductors and messenger strands alike.

When you use tough, strong Bethlehem strand as a messenger, you'll keep outages to a minimum. Bethlehem strand has exactly the right properties:

1) *High tensile strength.* Bethlehem strand is made in five grades, through Extra High Strength, to take care of all strength requirements.

2) *Good fatigue properties.* Fatigue tests show that bethanized wire is second to none.

3) *High resistance to corrosion.* Bethlehem offers 4 weights of bethanized (electrolytically applied zinc) coatings, as well as Bethalume (hot-dipped, aluminum-coated) strand for use in highly industrialized locations.

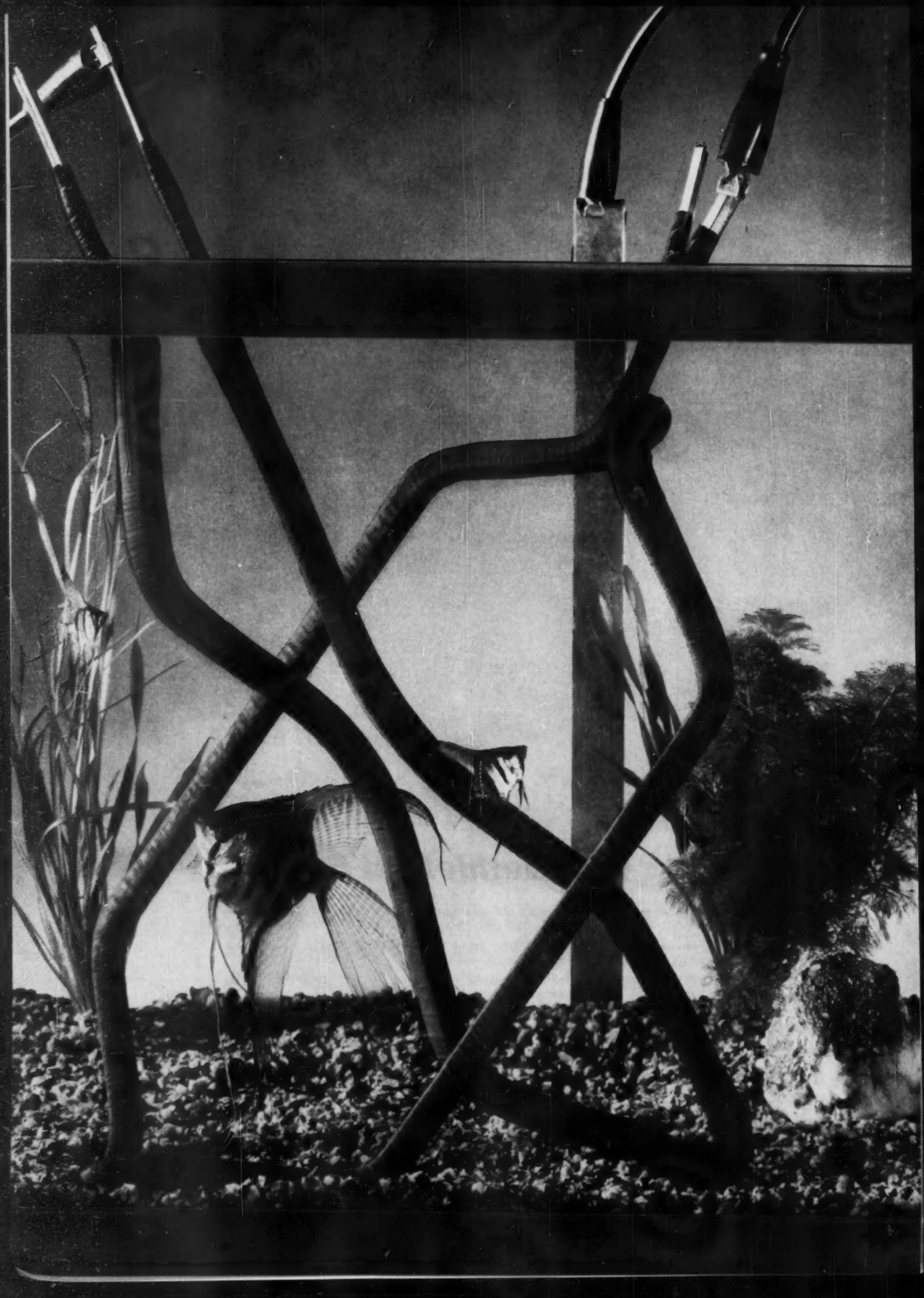
For complete information, call the nearest Bethlehem sales office.

Steel *for Strength ... Economy ... Versatility*

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.
Export Sales: Bethlehem Steel Export Corporation *Distributor:* Joslyn Mfg. & Supply Co.

BETHLEHEM STEEL

BETHLEHEM STEEL



Can Your Motor Coils Pass This Test?

E-M Sealflex...

the exciting new flexible epoxy insulation system does!

Sealflex is fully sealed and flexible to provide you with a worry-free coil insulation that protects against water, salt air, dirt, oil, chemicals, solvents and carbon black.

The motor coils on the opposite page are wound with Sealflex. One coil is an undistorted, normally formed coil. The other is bent into a figure 8 to demonstrate the extreme flexibility of the insulation. These 2300-volt coils successfully underwent a water immersion test at more than three times rated voltage! We know you won't be operating your E-M Motor or Generator in an aquarium, but this test demonstrates how a machine of Sealflex-protected coils can minimize your insulation worries.

This amazing, *flexible epoxy* form wound coil insulation system is the result of an extensive, long time program of sealed insulation research between the Irvington Division of Minnesota Mining & Manufacturing Co. and the Electric Machinery Mfg. Company. Fibremat* brand, a flexible B-Stage epoxy insulation, is a product of the world renowned tape research and fabrication facilities of the Minnesota Mining organization. The Sealflex coil is the product of E-M's team of skilled insulation experts . . . backed by more than 60 years of insulation know-how.

Fully-Sealed Protection

Sealflex is a completely sealed system. Each coil is precision wrapped with the newly developed, self-sealing, flexible B-Stage epoxy "Fibremat" brand tape. Curing at 400 F produces a thick, molded-on, tough sheath of high-dielectric strength insulation.

This full sealing, plus the stable characteristics of the epoxy base, make Sealflex especially resistant to tough ambients such as moisture, salt air, dirt, oil, solvents, chemicals, black liquor and carbon black.

Flexible for Long Coil Life

The resilience and toughness of Sealflex is permanent . . . permits the coils to flex with starting loads and to withstand repeated elongation and contraction due to changes in operating temperature. There is no tendency to brittleness and fracturing previously experienced with ordinary epoxy-base insulations.

The abrasion resistance of this new insulation is superior to conventional Class B materials. And its excellence in high dielectric strength and thermal stability contribute to increased reliability and long coil life.

Minimum Upkeep

Because of the super-sealing and moisture-resistant characteristics of Sealflex, there is no need to dry out the machine before startup after a prolonged shutdown. Maintenance is further reduced by the smooth epoxy hide which resists penetration of dust, dirt, and carbon black particles. It cleans easily with air hose or cloth and solvent.

Another first from E-M . . . Sealflex . . . a complete, integrated system designed to provide you with worry-free machine insulation for 130 C (Class B) service in the 600, 3000, and 5000 volt classes.

Get Your Free Brochure

Find out more about the Sealflex System in a new brochure that tells how modern chemistry and modern insulation research made E-M Sealflex best for *flexible*, fully-sealed coil protection from the especially tough ambients involving water, steam, humidity, salt air, dirt, oil, solvents, chemicals, black liquor and carbon black. Ask your nearest E-M Sales Engineer for your copy, or write directly to Electric Machinery Mfg. Company, Minneapolis 13, Minnesota.

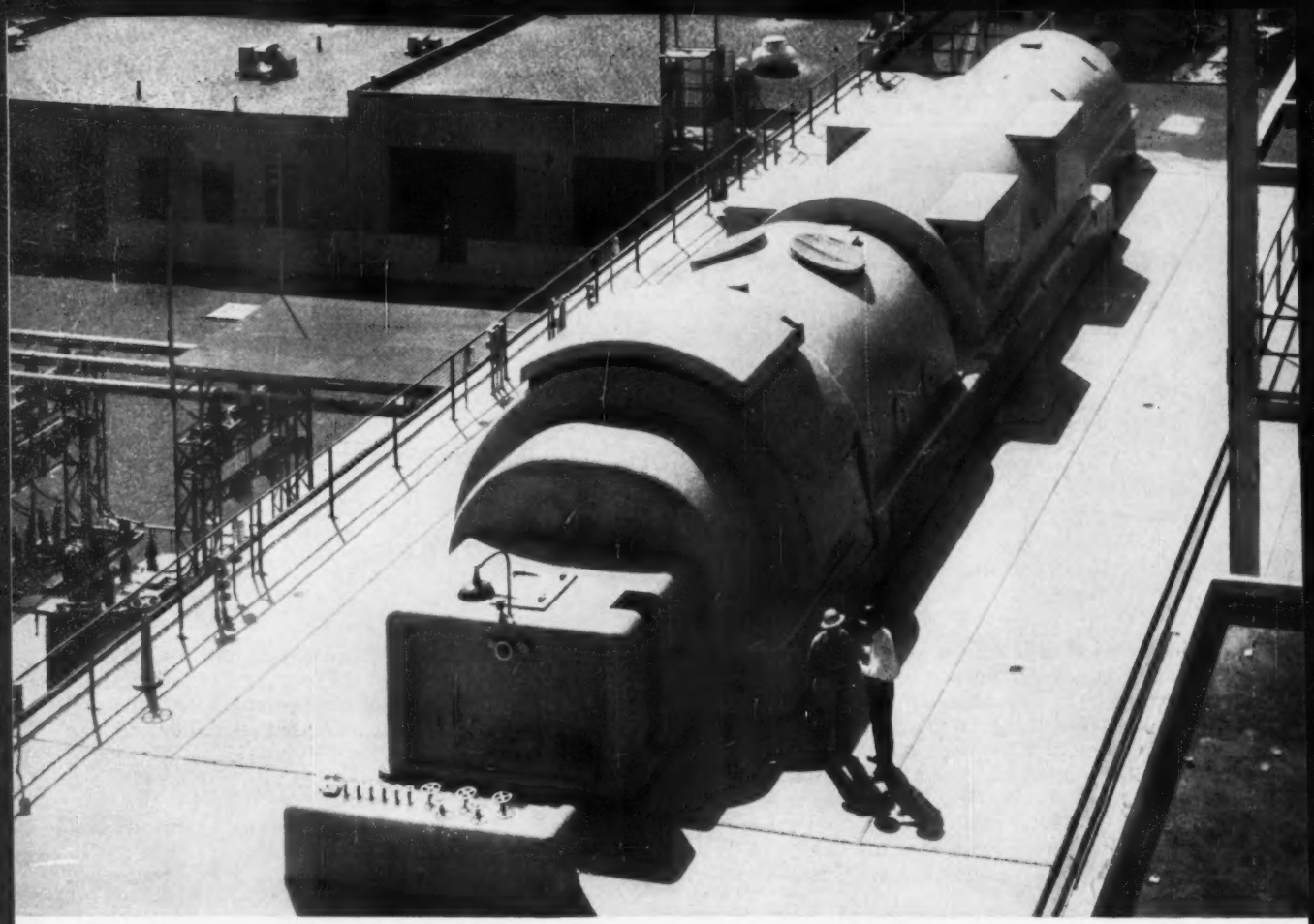
*A registered trademark of the Minnesota Mining & Manufacturing Co., St. Paul 6, Minn.

Specialists in making insulation do exactly what you want it to

E-M

200-TPA-2224

Induction Motors • Synchronous Motors • Motor-Generator Sets
High-Cycle Generator Sets • Water Wheel-Driven A-C Generators
Adjustable-Speed Magnetic Drives • Engine-Driven A-C Generators
Turbine-Driven A-C Generators • Motor Controls • Generator Switchgear



General Electric's turbine-generator service teams make periodic visits to inspect, evaluate, and help you maintain your powermaker for optimum on-the-line performance.

Rx for keeping powermakers on-the-line

General Electric's prescription for keeping your powermaker on-the-line at optimum performance capability takes effect while your unit is being installed. It includes:

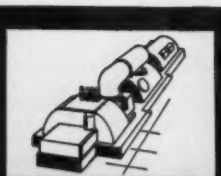
- assistance in training your operating personnel,
- periodic visits to check and discuss your unit's operation,
- assistance in planning and directing maintenance—plus prompt renewal parts procurement, and
- periodic reports on recent turbine-generator operating experience and engineering developments which may benefit your powermaker.

These are some of the "plus" services you get with a General Electric steam turbine-generator—for as long as your powermaker is on-the-line. 244-09

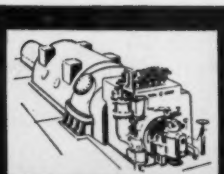
Progress Is Our Most Important Product

GENERAL ELECTRIC

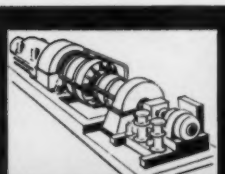
General Electric Turbine-Generators Help Keep Power Costs Low



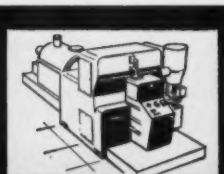
Steam turbine-generators for large blocks of power



Steam turbine-generators 100,000 kw and lower



Gas turbines for peaking, base load, combined cycles



Mechanical drive steam turbines for auxiliaries

Electrical World

NOVEMBER 20, 1961

Management Newsletter

Business Plans For Capital Spending (billions of dollars)

	1960 Actual	1961 Estimated	1962 Planned	1961-1962 % Change	1963 Planned
All Manufacturing	$14.48	$13.69	$14.59	+ 7%	$14.19
Mining	.99	.99	.99	0	.94
Railroads	1.03	.63	.64	+ 1	.70
Other Transportation & Communications	5.07	5.02	5.03	0	4.84
Electric & Gas Utilities	5.68	5.75	5.87	+ 2	5.97
Commercial	8.44	8.38	8.72	+ 4	7.85
ALL BUSINESS	35.69	34.46	35.84	+ 4	34.49

Source: McGraw-Hill Department of Economics

Business Plans 4% Increase in Spending

American business plans to spend 4% more on new plant and equipment in 1962 than it is spending during the current year. This is the most significant finding in the McGraw-Hill department of economics' fall survey of business plans—a survey which catches business executives early in their budget season. For 1962, business has set aside $35.8 billion for new plant and equipment. This year, it is estimated that the capital spending figure will be $34.4 billion.

Remember, this is not a forecast of capital spending. The survey merely represents the tentative plans of business for 1962 expenditures. And the tendency is for such plans to undershoot the actual mark in times of rising business activity.

Take a look at what happened to the survey's results when the economy was recovering from the last two business slumps. In the fall of 1954, business reported plans to spend 5% less on new plant and equipment in 1955 than in 1954. But by the spring of 1955, business had revised its plans and expected to spend 5% more than in 1954. Actual expenditures in 1955 exceeded 1954 by 7%. In the fall of '58, preliminary plans for 1959 called for an increase of only 0.5% over 1958. Actual expenditures turned out to be 7% higher.

The lesson to be learned from the experience of the past two recoveries is simply this. Business men are constantly revising their plans upward as economic recovery progresses. Thus, a total increase of 4% in capital spending would certainly be disappointing. But plans for a 4% increase made during this stage of the recovery could well indicate a far larger boost in capital spending when the actual figures are assembled at the end of the year.

One indication that an upward revision may be in the making is the trend of the

McGraw-Hill index of machinery new orders. The index has climbed steadily throughout the recovery from 162 (1950 = 100) in the fourth quarter of last year to an estimated 192 in the final period of this year. The McGraw-Hill department of economics forecasts that new orders in the first three quarters of 1962 will be 17% above the level of new orders this year.

Here's how American business is now planning to up its plant and equipment spending 4% during 1962. But keep in mind that all these figures represent tentative planning. They'll be revised depending on the performance of the economy. Capital spending is a lagging indicator. If the economy falters, business will cancel some of its plans. On the other hand, if business activity continues to move ahead, you can expect to see substantial upward revisions.

Manufacturers as a whole plan to spend $14.6 billion on new plant and equipment next year, a 7% increase over 1961. All major industries except electrical machinery and chemicals plan to increase investment next year. The durable goods industries plan to increase investment slightly more than soft goods producers. Here's the breakdown of manufacturers' planning.

Manufacturers Capital Spending Plans (billions of dollars)

	1960 Actual	1961 Estimated	1962 Planned	1961-1962 % Change	1963 Planned
Iron & Steel	$1.60	$1.16	$1.33	+15%	$1.21
Nonferrous Metals	.31	.26	.28	+ 7	.35
Machinery	1.10	1.10	1.17	+ 6	1.17
Electrical Machinery	.68	.68	.62	— 9	.63
Autos, Trucks, & Parts	.89	.68	.70	+ 3	.74
Transportation Equipment (Aircraft, Ships, R.R. eq'pt.)	.42	.39	.42	+ 7	.36
Fabricated Metals & Instruments	.95	.90	1.06	+18	.99
Chemicals	1.60	1.65	1.62	— 2	1.57
Paper & Pulp	.75	.72	.76	+ 6	.77
Rubber	.23	.22	.24	+11	.26
Stone, Clay & Glass	.62	.49	.53	+ 8	.53
Petroleum & Coal Products	2.64	2.78	3.06	+10	2.94
Food & Beverages	.92	.98	1.04	+ 6	.93
Textiles	.53	.51	.56	+10	.53
Miscellaneous Manufacturing	1.24	1.17	1.20	+ 3	1.21
ALL MANUFACTURING	**14.48**	**13.69**	**14.59**	**+ 7**	**14.19**

Source: McGraw-Hill Department of Economics

The big increase planned by the steel industry flies in the face of excess capacity that has existed for several years. Such an investment by this industry points to a continued concern with updating obsolete facilities and installing cost-cutting equipment. One of steel's competitors, the non-ferrous metals industry, now plans a 7% increase following a substantial cut in investment in 1961.

The electrical machinery industry will cut its investment in new plant and equipment by 9%, easily the biggest drop in the manufacturing sector. But the drop doesn't represent an extraordinary deterioration in the industry's spending. It's simply a reaction to the very high level of spending in 1960 and 1961, both of which were record years for the electrical manufacturers. In fact, with the exception of these two years, 1962 should be the highest capital spending year on record for the industry.

Biggest percentage increase planned is by fabricated metals and instruments. Instrument producers clearly will benefit from continued automation of production, and are gearing their investment to this growth.

Non-durable goods manufacturers are keeping close to the durable goods industries when it comes to spending. Only the chemical industry is currently planning a reduction. Chemicals has spent well over $1 billion every year since 1951, and the reduction in '62 is based on a low operating rate in most chemical lines.

Food and beverage companies indicate that they plan to hit the $1-billion mark in investment for the first time next year. This record level would put the food industry in the same league with chemicals, steel, and machinery. Much of food and beverage companies' investment is in modernization. Over 75% of the industry's equipment was installed prior to 1950.

Textile manufacturers will increase their spending by 10% in 1962. Most of this increase was reported before the announcement that textile manufacturers could write off equipment in 12 and 15 years instead of 25 years. Once these new regulations take hold, you can expect the textile industry to revise its plans in order to provide for even larger capital outlays.

All capital spending planned by manufacturers for 1963 is already higher than the 1961 level, and off only 4% from 1962. These plans are even more tentative than those for 1962. The significance of the figure is that its present magnitude represents a strong vote of confidence by business in the future strength of the economy.

In the non-manufacturing area, railroads plan to invest 1% more in 1962, reflecting improved levels of rail traffic and earnings since the recession. In other transportation, trucking and buslines expect to spend more next year. Airlines, having made substantial purchases of jet liners in the past few years, expect to reduce outlays substantially.

Electric and gas utilities together are scheduled to spend 2% more in 1962. Commercial business's reported plans to increase spending by 4% bring its investment to a record level of $8.7 billion. This reflects the continued expansion in new shopping centers, office buildings, warehouses, and other service establishments. Spending by mining concerns will hold at about the 1961 level.

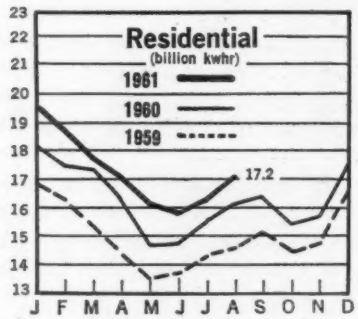
Aside from capital spending, the fall survey also asked business its views on a variety of economic weathervanes:

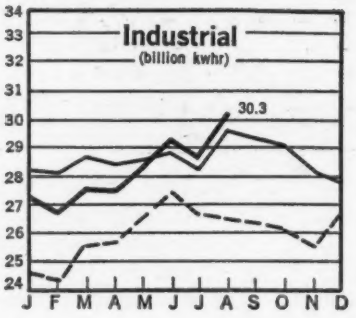
Operating rates have improved, but not enough to put real pressure on industry to expand its facilities. Manufacturers were operating 81% of their capacity in September, still considerably below their preferred operating rates. Nondurable industries were generally pushing nearer to capacity than durable manufacturers. Operating rates ranged from a high of 90% for paper and pulp manufacturers to a low of 82% for food and beverage industries. In durable goods the range went from 71% for transportation equipment to 78% for electrical machinery.

Sales expectations of manufacturers were optimistic. On the average, they expect sales to be up 7% in physical volume. Least optimistic is the petroleum industry, which looks for only a 2% increment in its sales. Most optimistic are producers of automobiles, trucks, and parts who look forward to an 8% boost.

Prices of capital goods will go up, if business's expectations are borne out. But the increase will be modest, probably less than 3%. A price increase of this magnitude does not suggest that business as a whole expects inflation. Historically, capital goods prices have risen at a faster rate than other prices during an inflationary period, and if their increase is held to less than 3%, the economy in general can expect reasonable price stability.

Monthly Sales of Electricity . . . through August





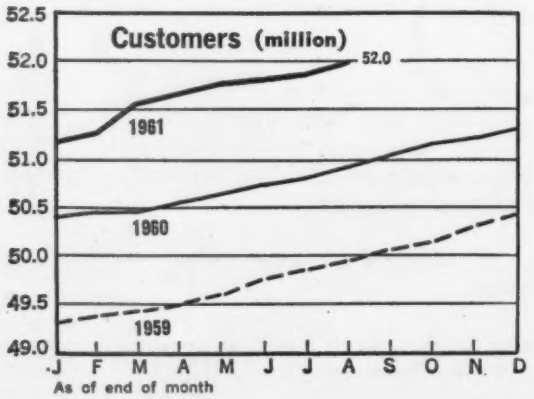
SOURCE: EDISON ELECTRIC INSTITUTE

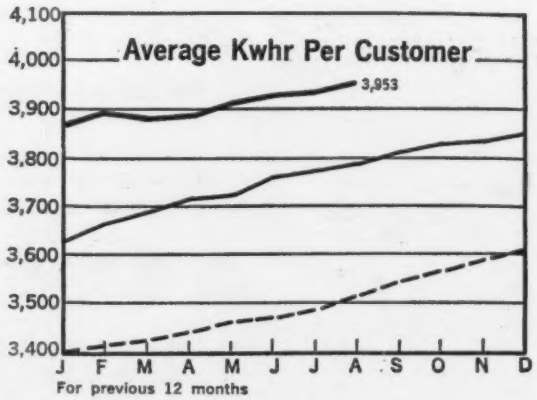
Power Statistics . . . through August

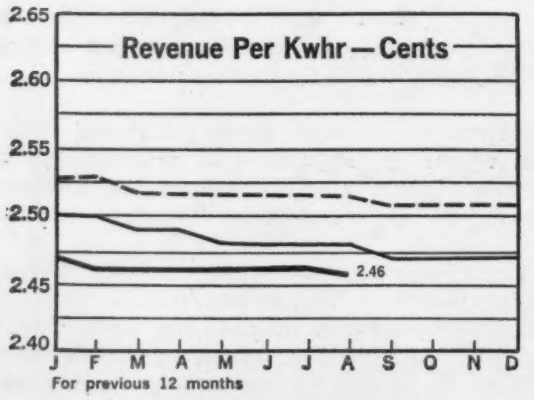
		Latest Month	Year Ago	Annual Change %
Capacity	million kw	177.13	164.28	7.8
Production	billion kwhr	71.49	67.26	6.3
Hydro		13.11	12.12	8.2
Fuel		58.38	55.14	5.9

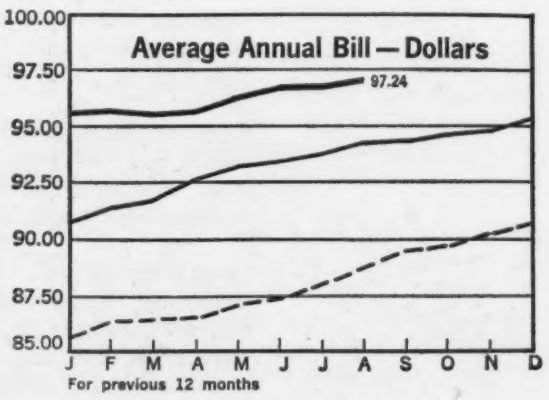
SOURCE: FEDERAL POWER COMMISSION

Residential . . . through August









SOURCE: EDISON ELECTRIC INSTITUTE

Why USS "T-1" Steel spiral cases were used on 5 famous power projects
Oahe □ Niagara □ Noxon Rapids □ Brownlee □ Swift

Oahe Dam will be the world's largest rolled earth dam . . . 9,300 feet long and 242 feet high. It will make a lake 250 miles long on the Missouri River above Pierre, South Dakota. Seven hydro-generators will have a total installed power capacity of 595,000 KVA.

USS "T-1" Steel cuts weight of spiral cases. Water for power generation will flow through seven spiral cases with inlet diameters of 20½ feet. USS "T-1" Constructional Alloy Steel not only met all requirements, but permitted a reduction in steel weight of about 45%. Total amount of USS "T-1" Steel used was 1,002 tons.

Continued on next two pages

This mark tells you a product is made of modern, dependable Steel.

United States Steel USS

TRADEMARK

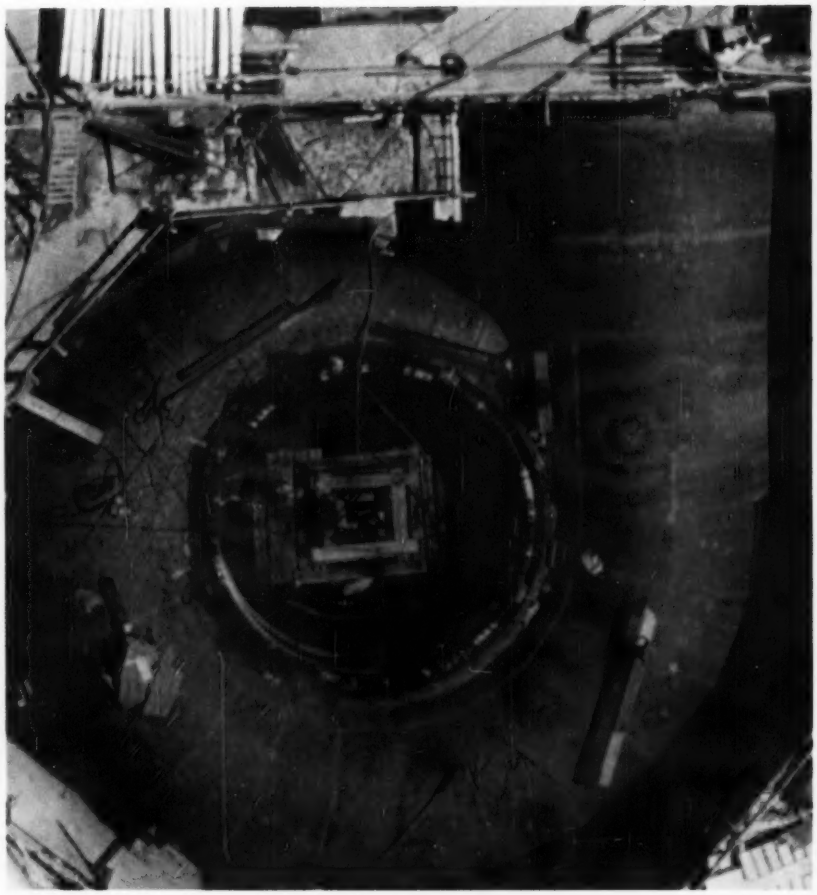
USS "T-1" Steel cuts

Continued from page one

Cost savings. By using USS "T-1" Steel with a minimum yield strength of 100,000 psi, plate thicknesses ranged from ½" to 1¼". With carbon steel, the spiral cases would have been almost twice as thick. Result: large savings in freight costs, erection time, and field welding costs. In future projects, costs might be reduced even more by the use of our new, more economical USS "T-1" type A Steel, which has the same strength.

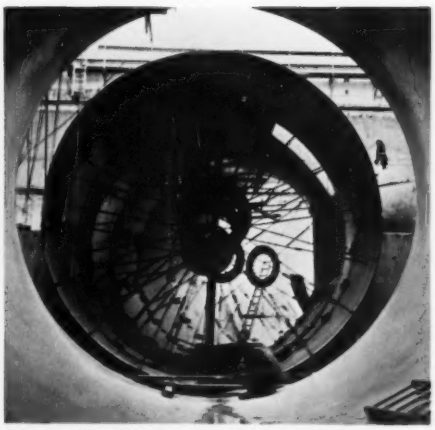
Carbon steel liners 24 feet in diameter for the seven hydroelectric power tunnels were fabricated by U. S. Steel's Consolidated Western Steel Division using 20,000 tons of structural carbon steel to make 449, 30-foot-long sections.

The Oahe Dam is being constructed under the supervision of the Corps of Engineers—U. S. Army, Office of District Engineer, Omaha, Nebraska. Powerhouse A-E: Sverdrup & Parcel & Associates, Inc. Powerhouse Contractor: Atkinson-Ostrander Company. Spiral cases were fabricated by the Hydraulic Division of the Allis-Chalmers Manufacturing Company (the supplier of completed turbines), and field welded and assembled by Chicago Bridge & Iron Company. Generators were supplied by General Electric Company.



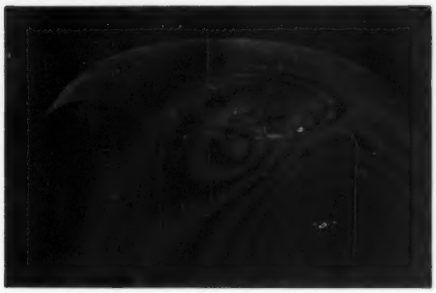
Niagara Power Project, Robert Moses Niagara Power Plant, The Power Authority of the State of New York. One of the largest power projects of all time. Total capacity—2,471,000 KVA. Thirteen spiral cases in main power plant designed for a 314-foot head of water, with inlet diameters of 21 feet, required 1,300 tons of USS "T-1" Steel. A design stress of 23,000 psi was used with a 100% joint efficiency for welds—all welds were X-rayed. Shell plates ranged in thickness from 0.36 to 0.97 inches and wing plates from 15/16 to 1⅞ inches. Hydraulic turbine builders: Baldwin-Lima-Hamilton Corporation and Newport News Shipbuilding & Dry Dock Company. Fabricators of the 13 spiral cases: Chicago Bridge & Iron Company–7 cases (plus field erection of all units), and Newport News Shipbuilding & Dry Dock Company–6 cases. Engineers: Uhl, Hall and Rich; general contractor: Merritt-Chapman & Scott Corporation.

weight of spiral cases up to 50%



Noxon Rapids Dam

Brownlee Dam



Swift Creek, Plant No. 1

Noxon Rapids Hydroelectric Project, Clark Fork River, Montana, The Washington Water Power Company of Spokane, Washington. Project's power capability—400,000 KW. The four spiral cases have inlet diameters of 24 feet, some of the largest ever built of field-welded USS "T-1" Steel. The spirals were designed for a 154-foot head. A design stress of 27,500 psi was used with a joint efficiency of 90% and all welds were X-rayed. Plate thicknesses were reduced approximately 50% from those that would have been required in carbon steel. The field erector, Chicago Bridge & Iron Company, used 432 tons of USS "T-1" Steel. Turbines by Allis-Chalmers Manufacturing Company; generators by General Electric Company; consulting engineers: Ebasco Services, Inc.; general contractor: Morrison-Knudsen Company, Inc.

Brownlee Dam, Snake River, Idaho, Idaho Power Company. Project's power capacity—450,000 KVA. Four initial spiral cases with inlet diameter of 18 feet were fabricated from 368 tons of "T-1" Steel. The cases were designed for a pressure of 148 psi. A design stress of 26,250 psi was used with a joint efficiency of 80% (21,000 psi). Plate thicknesses ranged from 15/16" maximum to 1/2" minimum with a weight saving of 45%. Fabrication was by Hydraulics Division of Allis-Chalmers Manufacturing Company. Engineering by International Engineering Co., Inc.; general contractor: Morrison-Knudsen Co., Inc.

Swift Hydro Project, Lewis River, Washington. Pacific Power & Light Company. Plant's power capacity—225,000 KVA. 126 tons of "T-1" Steel were used by the Hydraulic Division of Allis-Chalmers Manufacturing Company to fabricate three spiral cases with 11-foot inlet diameters and a design pressure of 205 psi. Plate thicknesses ran from 13/16" to 15/16" with an approximate saving in weight of 45%. Engineering and management by Bechtel Corporation; powerhouse construction by Guy F. Atkinson Company; other construction: Chas. H. Tompkins Company (now owned by J. A. Jones Construction Company). Generators were supplied by General Electric Company.

5 Projects—31 "T-1" Steel spiral cases. The trend today is toward large-diameter, field-welded spiral cases subjected to relatively high pressures. Under the ASME Code case 1204-8 for boilers and pressure vessels, the allowable stress value is 28,750 psi for USS "T-1" Steel compared to 13,750 for A285C Steel. Save up to 50% in the weight of steel, up to 50% in freight, about 30% in field fabrication cost, 60% in the weight of welding wire required . . . and the total cost of the steel is only slightly more. Write to United States Steel, 525 William Penn Place, Pittsburgh 30, Pennsylvania, for complete information on USS "T-1" Steel. USS and "T-1" are registered trademarks.

United States Steel Corporation • Columbia-Geneva Steel Division
Tennessee Coal and Iron Division • United States Steel Supply Division
United States Steel Export Company

USS United States Steel

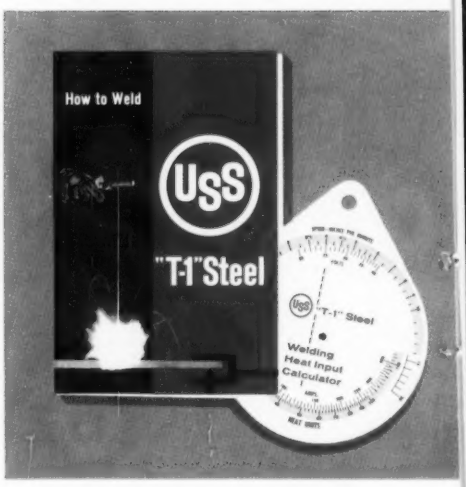
Send for new movie, "How to Weld USS 'T-1' Steels"

This new 18-minute, 16mm color motion picture shows concisely the practices involved in welding USS "T-1" Steels. If you are fabricating "T-1" Steel in your shop, this film and copies of the booklet will be a big help in demonstrating the proper technique to your welders. Fill out the coupon below and indicate the number of booklets you will need.

Included in the booklet is a handy welding heat-input calculator that helps a welder choose the proper welding machine settings. The film, together with the booklet, will help every welder to weld USS "T-1" Steels readily and successfully.

We'll gladly lend you the film and furnish enough free copies of the booklet and heat-input calculator for your shop personnel. USS and "T-1" are registered trademarks.

United States Steel Corporation • Columbia-Geneva Steel Division National Tube Division • Tennessee Coal and Iron Division • United States Steel Supply Division • United States Steel Export Company



United States Steel

USS

United States Steel, Room 6411
525 William Penn Place
Pittsburgh 30, Pennsylvania

Gentlemen:

Please lend me your 16mm color, sound movie, "How to Weld USS 'T-1' Steels." Also, send me_____booklets of the same title. I understand there is no obligation.

Name_____

Title_____

Company_____

Address_____

City_____ **Zone**_____ **State**_____

(*Continued from page 57*)

we believe we know of a seeding material, to be introduced into the combustion chamber that has a conductivity as good as cesium but costs only 1/500th as much."

Way described a 500-Mw plant with a 55% station efficiency and 6,160 Btu heat rate using an MHD generator with a net output of 278,-700 kw and a turbogenerator with a net rating of 231,000 kw. It would have these conditions: air flow of 306 kg per sec; coal flow, 28.7 kg per sec; generator length, 17 meters; seeding ratio, 0.002 cesium in gas; field strength, 30,000 gauss. Use of reheat in the MHD generator can significantly reduce generator length for a given efficiency. Also, said Way, upping the cesium concentration from 1% to 2% cuts the generator length 30%.

Studies have shown that the oxygen cycle is a promising one for MHD generators of 500 Mw or higher. T. R. Brogan, Avco-Everett Research Lab reported. But problems attending the "boiler" are a 4,000F inlet temperature, high alkali content of the gas, high-pressure combustion at 5,300 F with ash vaporization, and re-capture of the seed gases. He noted they can produce conductivity of 100 mhos per meter in gas at 3,000 F.

Fuel cells are both a promise and a threat to electric utilities, James D. Flynn, Cincinnati Gas & Electric Co said. Promising lower production costs through greater efficiency, fuel cells in small sizes potentially could put each home owner into the power business. As development advances into the kilowatt range, fuel cells may stimulate brisk competition among oil, gas, and electric companies as a "single-source" energy supplier. But in the megawatt sizes they will tend to favor electric companies over other suppliers.

"Our concept is a low-pressure, low-temperature fuel cell to be operated by non-technical personnel," said J. L. Platner, Allis-Chalmers Mfg Co. Among three systems, using hydrogen, alcohol, or ammonia with oxygen, the ammonia-oxygen system offers hope that power at 3 v, 150 amp can be produced for 5-6 cents per kwhr for fuel only when the catalyst corrosion problem is solved.

T & D SYMPOSIUM PLANNERS A. E. Hill, New England Power Service Co and J. A. Rawls, Virginia Electric & Power Co confer over details between sessions

Lightning Impedance Found

Another highly useful tool in the analysis of lightning problems has been forged. In a unique application of field theory concepts, C. F. Wagner and A. R. Hileman, Westinghouse, have estimated the surge impedance of a return lightning stroke. They found it to be about 3,000 ohms. This determination is useful in calculating the length of a return stroke of lightning and for determining the wave front of the stroke current. Stroke surge impedance allows coordination of stroke potential with resultant final current at ground. Moreover it permits estimates of how reflections within the impedance of stricken objects might affect stroke characteristics. With stroke current known it is possible to find stroke potential and so estimate length of stroke. Such calculations are particularly useful in estimating the number of shielding failures for given configurations of transmission line ground wires and conductors.

Ferro Resonance a Threat

EHV overvoltage caused by load rejection can be a problem where utilities are adding high-capacity transmission lines rapidly. Such overvoltages can grow out of ferro-resonance when transmission line capability overbalances generating capability on either hydro or steam systems. P. L. Dandeno and K. R. McClymont, described an investigation that came about when Ontario Hydro decided to proceed with development of 500 Mw of hydro generation in NE Ontario. This generation is to be linked by 460/500 kv lines to load centers 400 miles away. Study showed that severe overvoltages can occur if receiving-end breaker opens while the sending-end breaker stays closed. Under these conditions, with the line connected to the hydro generation system overvoltages are limited by transformer saturation.

Analogue computer studies undertaken in connection with the problem were described by F. P. de Mello, D. A. Swan, A. C. Dolbec and M. Temoshok, all of GE. In discussion Temoshok observed that ferro resonance problems are usually associated with overhead lines and hydro systems but can also occur on systems with heavy concentrations of capacitors and cable.

Survey OK's Butyl Insulation

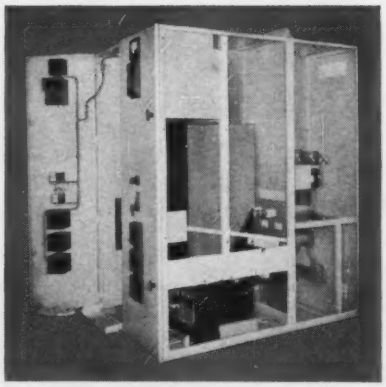
A survey among users of butyl rubber insulated cables in utilities and industry, summarized at AIEE's Second Symposium on Butyle Rubber Wire and Cable Insulation, has verified "favorable and satisfactory experience". Returns covered 87 utility and 45 industrial users with 55 million conductor-feet in use; 92% by utilities. Forty utility users reported no failure on butyl-insulated cable. Most others reported satisfactory operation although they had some failures. Several users reported trouble with corona cutting and tracking.

More features make Westinghouse metal-clad switchgear

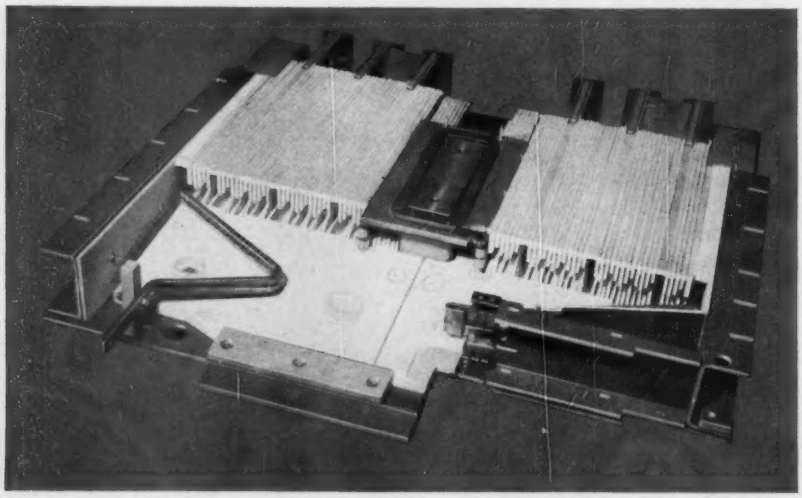
Westinghouse metal-clad switchgear is design proved in the Westinghouse High Power Laboratory. It meets all industrial, electric utility, commercial, institutional, and other needs for 75 to 1000 mva service inclusive, 4.16 through 13.8 kv.

Check below for advantages of this equipment that are of major importance to you.

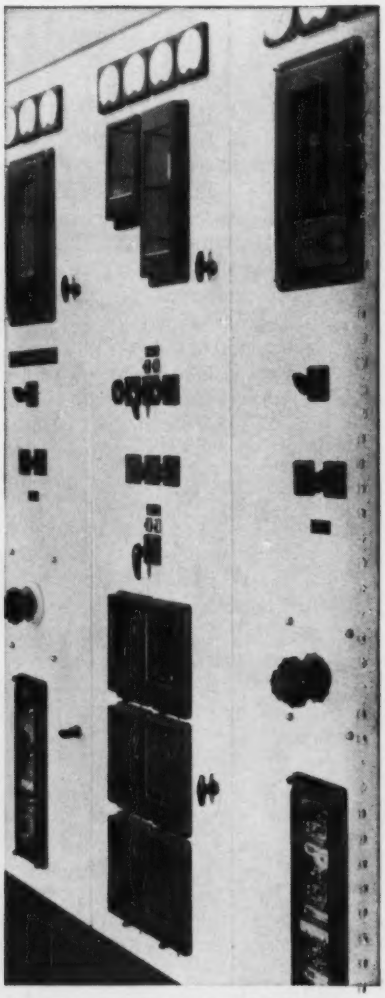
For further information, call your Westinghouse representative or write for a copy of Descriptive Bulletin 32-250 to Westinghouse Electric Corporation, P.O. Box 868, Pittsburgh 30, Pa. *You can be sure . . . if it's Westinghouse.*



Balanced insulation protection is provided by the exclusive "Limitrak" insulation system on bus supports, arc chute enclosure and breaker bushings.

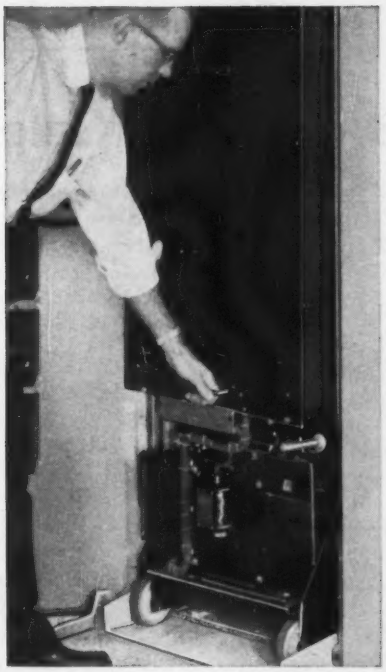


Fast, positive circuit protection is provided by the De-ion principle of arc interruption with center coil arc chute design.



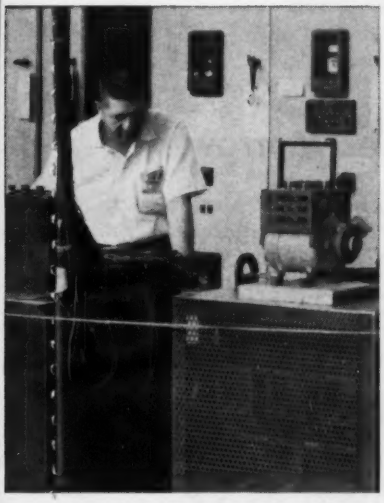
Adequate space for varied relaying and instrumentation is assured by full height front panels.

your best buy

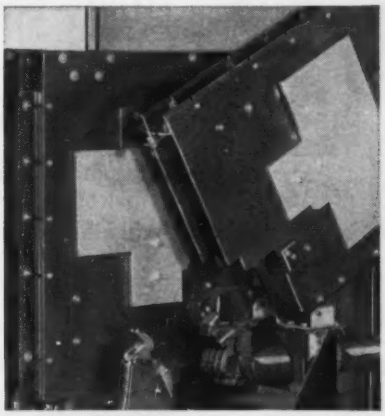


Simple, quick inspection, maintenance and replacement of DH breakers is made possible by horizontal drawout construction.

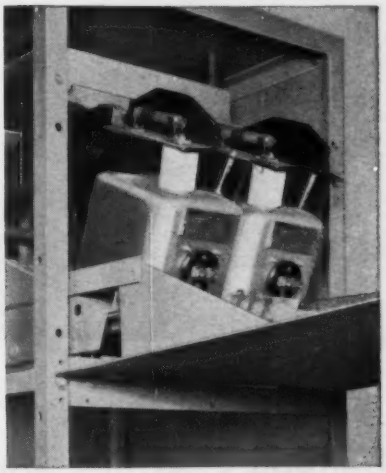
Complete joint sealing with polyester compound at main contact supports and main bus provides full insulation.



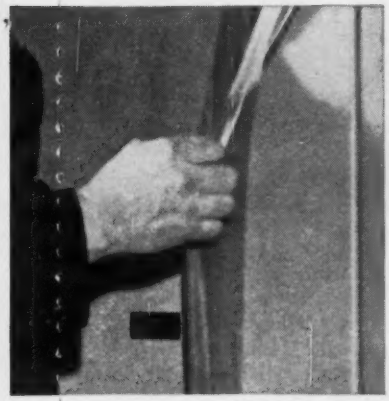
Proper component functioning is verified by a continuing program of production inspection and testing.



Hinged arc chute permits easy tilting for inspection and maintenance of contacts with DH breaker in drawout position.



Personnel are protected by separate compartment drawout-type mounting of potential transformers.

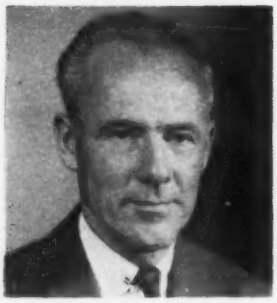


Front panel is protected during assembly, shipment and installation by strippable plastic coating.

Thorough phosphatizing and priming treatment safeguards against corrosion and provides a superior base for finish coat.

Westinghouse

J-61014



WARD

Ward Replaces Gale as Chairman

J. Harris Ward has been elected to succeed Willis Gale as chairman and chief executive officer of Commonwealth Edison Co. Nicholas Galitzine became a vice president.

Ward will continue as president, the position he has held for the past two years. He has been with the utility since 1938. Ward was elected a secretary in 1948, vice president in 1951, vice president and treasurer in 1952, and executive vice president in 1955.

Gale, scheduled to retire in three years, will continue in active service with Commonwealth Edison as chairman of the executive committee.

Gale has been with Commonwealth Edison since 1937. He joined the utility in that year as vice president and chief financial officer. He was elected president in 1951 and chairman in 1953. Gale previously served with North American Light & Power Co and its subsidiaries.

Galitzine has been assistant to the chairman of Commonwealth Edison since 1950. He joined the utility in 1923 and has served in various sales and administrative capacities.

GALITZINE

MORROW

Missouri Utility Names Morrow VP

Missouri Power & Light Co has chosen Carl W. Morrow, secretary and assistant to the president, to become a vice president. His administrative duties as assistant to the president will be broadened.

Morrow joined the utility 24 years ago as a clerk. He became assistant to the president in 1946, assistant secretary in 1948, assistant general manager in 1954, and secretary in 1958.

General Electric Chooses Rieger to Succeed Linder as VP

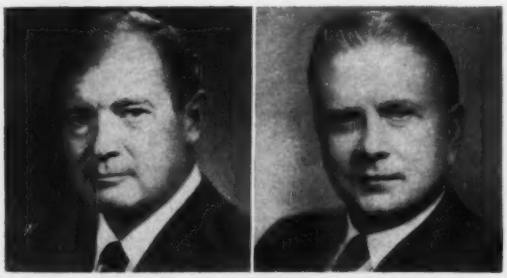
General Electric Co has moved a marketing-oriented executive into the top post of its electric utility group. Charles K. Rieger was appointed vice president and group executive of the group.

Rieger succeeds Clarence H. Linder, who will retire in January, 1963. Until his retirement, Linder will serve as a vice president and consultant to Rieger.

Meanwhile, Donald E. Craig was appointed general manager of the turbine division, headquartered in Schenectady, N. Y. Craig has been general manager of the meter department, Somersworth, N. H.

Rieger has been with General Electric since 1936, when he was graduated from the University of Missouri with a B. S. in electrical engineering.

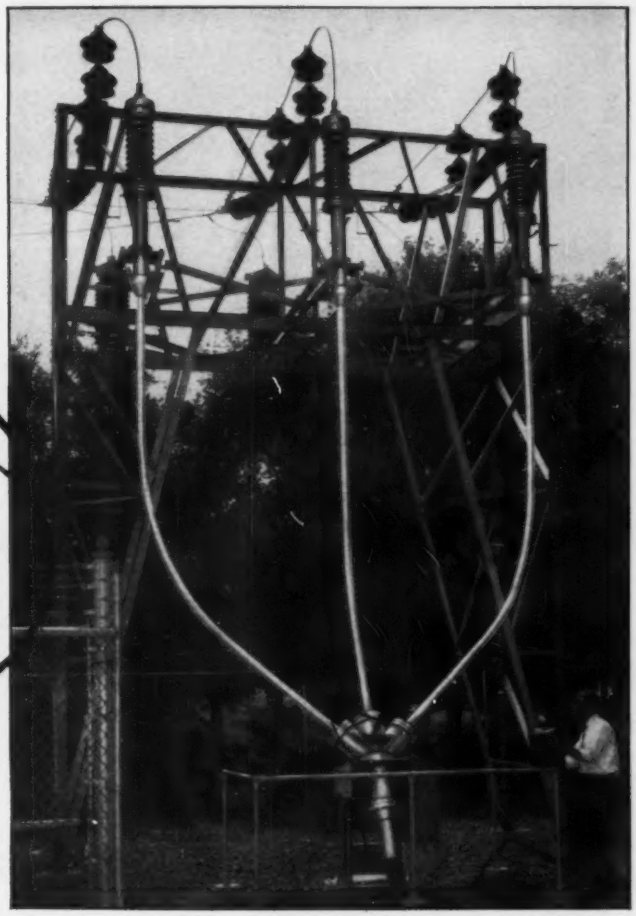
In 1937 he was transferred to the GE fractional horsepower motor plant in Fort Wayne, Ind., as a sales engineer. During World War II he was assigned to Wright Field in Dayton, Ohio, in charge of GE work there. He returned to Fort Wayne in an engineering capacity in 1944.



RIEGER CRAIG

From 1946 through 1951 he handled various assignments in appliance businesses. In '51 he became general manager of the small appliance division. He was named a vice president in 1953. In 1959 the company picked Rieger to head its marketing services. He held this position until his present promotion.

LILCO
completes first 69-kv self-contained aluminum cable installation



Long Island Lighting Company has recently completed installation of a 69-kv, high-pressure gas self-contained, aluminum-sheath cable underground and aerial through a suburban customer residential area. Results have been excellent. Part of a 75-mva loop, the installation has been found practical and economical.

Appearance of the aerial cable is trim, indicating that there is now available a means of transmitting bulk power more acceptable to the public than open-wire construction. Cost is estimated at approximately half that of underground pipe-type cable of similar capacity.

G&W has supplied a unique termination for this cable installation. The three-conductor, high-strength, aluminum-sheathed, 800-mcm cable is led at an angle into an aluminum spreader head. Aluminum tubing carries the individual conductors to separate G&W type ATA-N single-conductor potheads. Mechanical seals on both the spreader head and potheads permit the entire termination to operate at full cable gas pressure. G&W also supplied the gas-control cabinet that maintains pressure between 180 and 235 psi on the whole system.

G&W is a *specialty* company that welcomes unusual cable-termination and joint problems. By concentrating on cable accessories, G&W is able to devote research time toward development of termination characteristics for even the most advanced applications. Your special needs are our business—consult us, or your G&W representative.

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superior quality standards — inspired specialized design

A61-3

A First in Economic Dispatching

PHILADELPHIA ELECTRIC'S DIGITAL

Control Console functions as the nerve center for Philadelphia Electric's digital computer-directed economic dispatch system. From this console, power directors operate and supervise the loading of 34 steam and hydro generating units with a combined capacity of 3500 MW. Console is located in the utility's dispatching center in midcity Philadelphia.

COMPUTER-DIRECTED CONTROL SYSTEM

In its new economic dispatch system—the first of its kind in the utility industry—Philadelphia Electric Company combines an industrial digital computer with high-speed analog control elements to automatically assign generation. Developed jointly by Honeywell and Philadelphia Electric, the new system not only assigns generation for minimum incremental cost, but also computes tie-line interconnection billing data and solves other problems relating to power system operation.

Here are a few of the operating advantages the digital computer-directed system brings to Philadelphia Electric's extensive generating network:

1. The digital approach aids in modifying the control system as the power network changes or grows. Advances in the control art can be set into the computer by routine changes in the machine's program. This benefit can be realized only with digital computer-control.

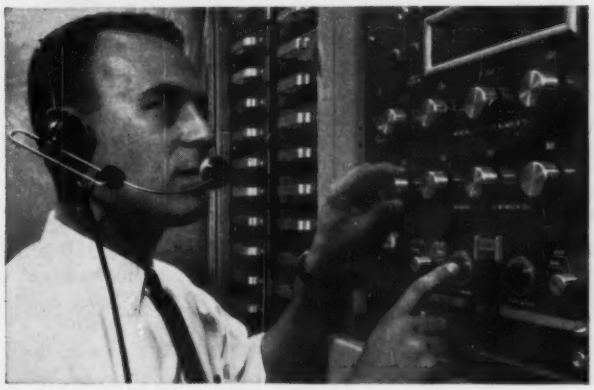
2. The efficiency characteristics of each generating unit can be followed with greater accuracy.

3. By considering both positive and negative slopes in unit incremental cost curves, the new system provides cost savings for Philadelphia Electric and other utilities who may use the Honeywell system to control valve point openings with their accompanying negative slopes in loading steam turbines. The use of analog equipment would necessitate a compromise between actual and programmed curves.

The system is designed for highest reliability with full consideration given to human engineering factors. Circuitry is all solid-state. System amplifiers, governor motor actuators, and rate limiters replace motors, servos, slidewires and vacuum tubes.

In the Philadelphia Electric dispatch system *all basic elements and virtually all the components*—from precision switches and meters to the computer and control console—were produced by a single manufacturer—*Honeywell*. Because of the integrated capabilities of its Industrial Products Group, Honeywell has been able to provide Philadelphia Electric with the world's most advanced economic dispatch control system.

For information on what Honeywell's Industrial Products Group can do for you, contact your nearest Honeywell field engineer. MINNEAPOLIS-HONEYWELL, Wayne and Windrim Avenues, Philadelphia 44, Pennsylvania. In Canada, Honeywell Controls, Ltd., Toronto 17, Ontario.



Honeywell 290 Digital Computer combines with high-speed analog control elements to assign generation at minimum incremental cost. In making allocations, computer operates unattended and bases calculations on incremental production cost curves, fuel costs, performance characteristics, transmission losses and other information. Computer's instructions are then telemetered to power stations. Every ten seconds, the computer samples desired steam generation and makes new economic calculations which reset assigned generation among units. On command, the computer shares the control function with that of interconnection billing computation.

Station Consoles, located in each of Philadelphia Electric's nine plants, permit setting of the generating units' high and low limits and their rate of change based on operating conditions.

Honeywell

First in Control

HONEYWELL INTERNATIONAL Sales and Service offices in principal cities of the world. Manufacturing in United States, United Kingdom, Canada, Netherlands, Germany, France, Japan.

EEI Hears Aluminum Corrosion Debated (*Continued from page* 54)

crews to avoid costly coordination delays. Cables must be readily identifiable, with adequate sheath or neutral bonding of both systems which are bonded together with a No. 6 conductor at every transformer location, they said.

Kemnitz and Smith foresaw joint maintenance of underground service cables combining electric and telephone conductors run from joint service pedestals. This, they predicted, would afford additional savings. They suggested that the new underground designs be considered for replacement of "obsolete" overhead distribution.

The appearance of utility facilities is a real problem that can be solved simply, and economically, said H. H. Brooksieker, Cleveland Electric Illuminating Co. Underground is not the panacea, and more sightly overhead and underground plant alleviates the problem. The movement toward higher operating voltages brings improvement in appearance by reducing the circuits required, he said.

Standards Aid OH Appearance

CEI's program to improve appearance, he continued, imposes these five requirements: Facilities must be adequate, provide the required reliability, be as economical as possible, have satisfactory appearance, and provide safety to employees and the public. Standards show the maximum overhead plant for industrial, commercial, and residential areas must be met for all new or additional construction. Alternatives are to rebuild the area, reroute lines, or put some facilities underground, he said.

Switch failures on ungrounded-wye capacitor banks have been traced to voltages up to 10 kv imposed on control wiring in the grounded mechanism, reported J. E. Conner, Southern California Edison. But this trouble has been overcome by connecting a low-voltage arrester between switch tank and control wiring. Switching of shunt capacitors is suspected also of causing steep-front overvoltages on adjacent equipment, he said. This may prove troublesome as capacitor installations increase.

The aerial basket safely and efficiently performs many jobs, yet has inherent hazards, said B. J. Lorenz, Northern Indiana Public Service.

People, he said, must be shown that the aerial basket is not an insulated cure-all. The concept of an insulated boom and basket can lead ground personnel to overlook the possibility of shock, despite the fact most equipment does not receive adequate dielectric check. He recommended keeping ground people from touching the equipment except where proper precautions have been taken. Serious accidents to the man in the basket, he said, can be avoided by belting him in. A short nylon lanyard attached to the back of his belt would limit free fall and keep him from trying to stand on the rim. Lorenz warned against moving a truck with a man in the basket and recommended study of use of rubber gloves in baskets.

Gives NELPA Sales Pointers

Plymire explains how Puget Sound P&L made underground service and Gold Medallion home a saleable 'package'

Underground service combines with the all-electric concept to make an effectively selling package to new many-home developments, commercial groups of the Northwest Electric Light & Power Association were told recently at Spokane, Wash. The group consisted of sales, rate, and public relations utility people.

R. F. Plymire, Puget Sound Power & Light Co, said that the above conclusion was made by his utility following its study of the feasibility of selling total-electric plans for a 3,500-home tract. Selling, he said, hinged on the practicability of underground service.

For the first 63 homes of the Somerset development, he said, a decision had to be reached concerning a contract with the developer with these provisions:

1. That the developer would provide that all 63 homes were qualified for Gold Medallions.

2. That the developer would install, own, operate, and maintain the secondary underground system at a capital cost averaging $200 per lot.

3. That Puget would install, own, and operate the primary underground system at a capital cost averaging $654 per lot.

To date, 200 homes at Somerset have been contracted for on these terms, Plymire noted, adding that a second developer has contracted for 44, and that "substantial residential building developers" have recognized the advantages of total-electric installations associated with underground service.

The basic contract emerged from studies of Puget's sales and engineering departments, he said, noting that the study showed that:

1. If all 63 homes of the first Somerset development were served by a modern underground system (direct burial cable and pad-mounted transformers), the utility's cost of the primary underground, including transformers and meters, would be $41,200 ($654 per customer) compared to annual revenues of $22,000 ($350 per customer), a 1.9:1 ratio.

2. If competitive fuels took the water heater and space heating load and the project were served overhead, Puget's cost of the overhead system would be $19,600 ($310 per customer) compared to annual revenue of $5,040 ($80 per customer), a 3.9:1 ratio.

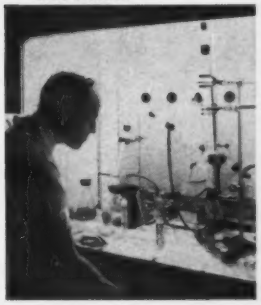
3. If competitive fuels took the space heating load only and the project were served overhead, Puget's cost of the overhead system would be $21,400 ($340 per customer) compared to annual revenues of $6,930 ($110 per customer), a 3.2:1 ratio.

"The figures," said Plymire, "assume that the developer would install the secondary portion of the underground system—the service conductors from the pad-mounted transformers to the individual

(*Continued on page* 98)

Electron Microscope magnifies particles of battery raw material 16,000 times, increases understanding of physical properties—gives improved Gould battery performance.

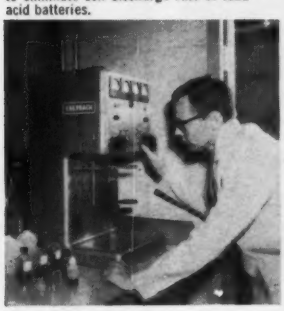
Analyzing nature of impurities in battery material—one of many special projects carried on by Gould-National technicians to increase the life of Gould batteries.

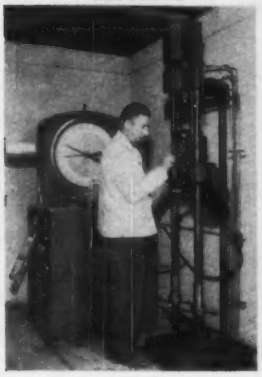


Gould-National Battery Research Center in Minneapolis, Minn., and quality control facilities at Kankakee, Ill., and Trenton, N.J. assure you that only the highest quality is built into Gould batteries.

Tensile Test Unit studies tensile and compressive strengths and percentage of elongation of various materials—used to develop stronger containers for Gould batteries.

Quantitative Analysis Unit determines percentage of element concentration in metal samples. Currently used in study to eliminate self-discharge rate of lead-acid batteries.





BATTERY RESEARCH . . . 24 HOUR JOB AT GOULD-NATIONAL

At the Gould-National Battery Research Center around-the-clock testing produces a continuous stream of new ideas. Here, creative research minds and the latest scientific equipment combine to assure you of batteries designed and engineered to meet today's most exacting requirements . . . and to anticipate the answers for tomorrow's standby power needs. Gould stationary batteries are available in Plante, Calcium and Kathanode types. Complete stocks and service facilities are located across the country.

CHARGERS—A full line of specially engineered stationary charging equipment available: float, filtered and unfiltered. Ask about the new FLOAT-O-MATIC charger.

Write for detailed information, or call your local Gould office listed in the Yellow Pages under "Batteries, Industrial." Sales offices and agents in continental United States and overseas.

NEW Gould Rechargeable Flashlight and Lantern Batteries

Of nickel-cadmium construction, these batteries can be recharged to full capacity over 250 times . . . and each cycle gives 50% more continuous, bright light than ordinary cells. Ask for free literature.

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GOULD-NATIONAL GN BATTERIES, INC.

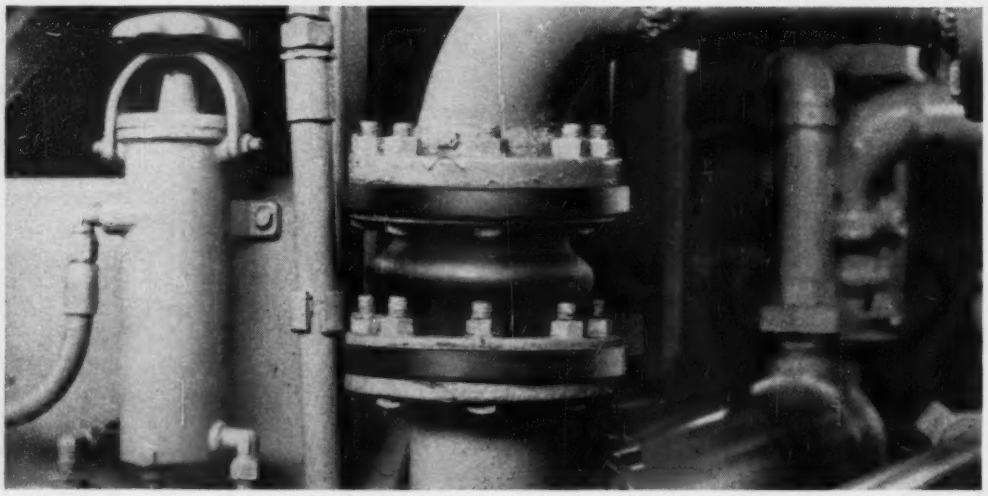
INDUSTRIAL BATTERY DIVISION

GOULD-NATIONAL BATTERIES, INC.

St. Paul 1, Minnesota

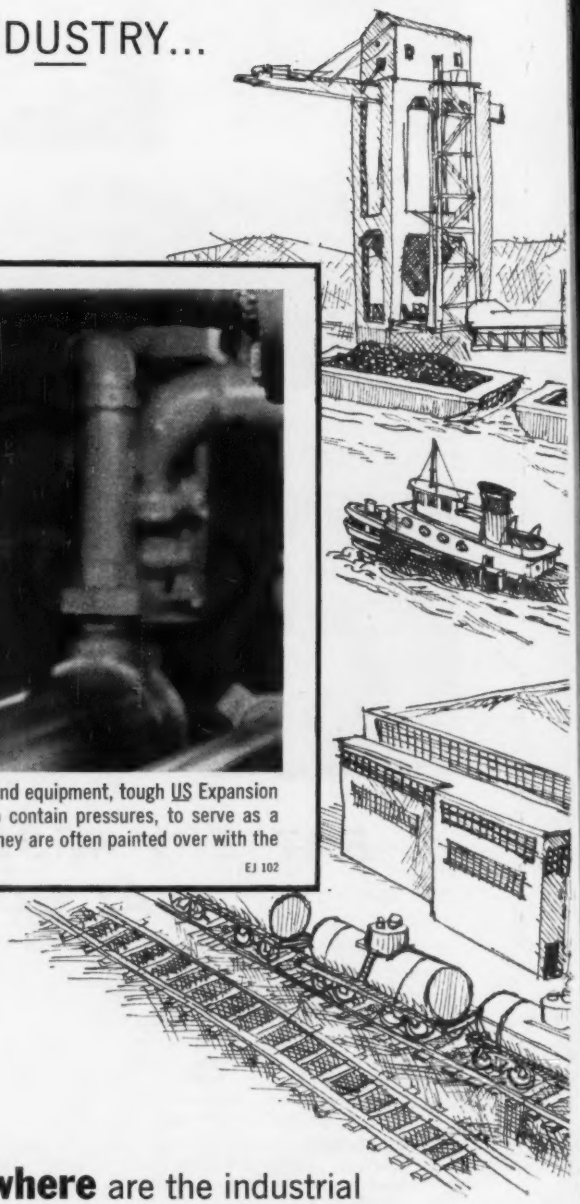
US RUBBER

AT THE HEART OF INDUSTRY...



Absorbing expansion and contraction forces before they can damage piping and equipment, tough US Expansion Joints compensate for misalignment and soak up vibration as well. Their ability to contain pressures, to serve as a permanent, maintenance-free part of the piping system is indicated by the fact that they are often painted over with the rest of the equipment.

EJ 102



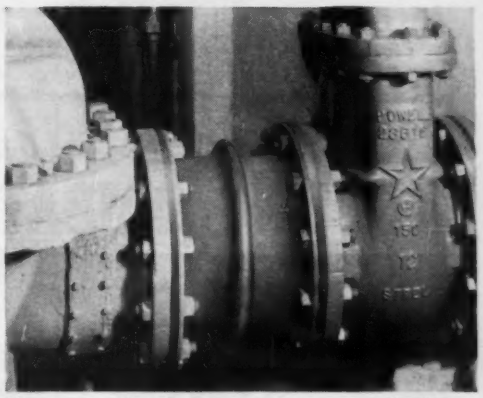
Making good sense to utilities everywhere are the industrial rubber products from US. Materials flow faster, conversion is more efficient, maintenance is minimal. US, world's largest manufacturer of industrial rubber products, has a unique way of answering industry's needs.

Most recommended for superheated and saturated steam at temperatures to 750°F., US asbestos-base Style 899 Sheet Packing also gives superior service with ammonia, gases, oils, gasoline, some acids, alkaline solutions, and other chemicals. Made of specially selected long-fiber asbestos, Style 899 Sheet Packing won't soften, burn or blow at joints and flanges.

P 103

Detroit Edison fires one of the world's largest power generating stations, handles its coal supply with the aid of US Conveyor Belts. These belts move coal to storage at the rate of 2,500 tons/hr. at speeds to 550 fpm at Detroit Edison's St. Clair Power Plant. The widespread use of US Conveyor Belts by utilities is ample endorsement of their ability to provide years of service without costly breakdowns.

CB 109



Name your chemical, name your processing temperature, and you'll get a customized U.S. Chemex Expansion Joint designed to operate on your piping with maximum efficiency. Neither flow surge, pressure, temperature, nor corrosive action will cause money-losing down-time when your processing equipment is protected by chemical-resistant U. S. Chemex Expansion Joints.

EJ 103

For every industrial rubber product need, turn to US. For Conveyor Belts, V-Belts, the original PowerGrip "Timing"® Belt, Flexible Couplings, Mountings, Fenders, Hose and Packings... custom-designed rubber products of every description. Discover why U.S. Rubber has become the largest developer and producer of industrial rubber products in the world. See your U.S. Rubber Distributor or contact US directly at Rockefeller Center, New York 20, N. Y.

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OF INDUSTRIAL RUBBER PRODUCTS

United States Rubber
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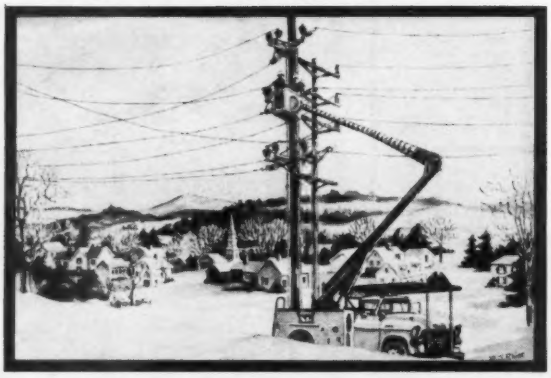
Line maintenance time and costs cut up to ⅔ with HI-RANGER towers



• Transfer and remove taps (62% saving) • Group light replacement (33% saving) • Respace insulators (66.6% saving) • String 69kv Lines over hot 12kv circuit (50% saving) • Repair lines in midspan (62.5% saving). Retap sub from one 34.5kv circuit to another (33.3% saving) •

The time and cost savings shown above for typical utility operations have been carefully documented by several utility firms. You can achieve these and other benefits through the use of insulated Hi-Ranger towers equipped with all-fiberglas upper booms and baskets. Mobile Aerial Towers will welcome the opportunity to show you how. SEND FOR THE COMPLETE HI-RANGER UTILITY STORY NOW.

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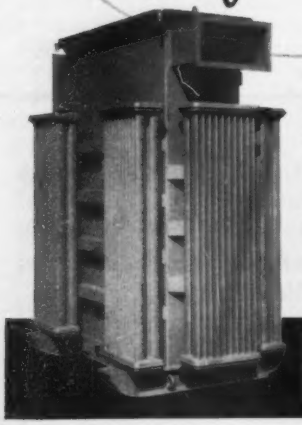

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Gives NELPA Sales Tips

(*Continued from page* 94)

homes. If Puget's investment could be restricted to the primary system and the project to Gold Medallion homes, the underground system becomes an extremely attractive investment."

Leo Chaffin said that Portland General Electric Co's installations were similar except that secondary service is usually installed by the utility. He predicted that 15 to 20% of residences and 75% of commercial loads in the PGE area will be served from underground within five years.

Reporting on PGE's experience over the past seven years, Chaffin said that more than 3,000 housing units are served from underground, PGE having established the basis for any underground service requested.

The charge for residential underground service is the average difference between cost of overhead vs underground, but a credit is given for a total-electric load in a single dwelling of $1 per front ft up to $100. Lump sum figures have been worked out that can be applied to new requests for service. For commercial customers, PGE works out a division of equipment responsibility which corresponds roughly to the difference-in-cost approach for residential customers.

AEC Adopts Conflict Law

The Atomic Energy Commission has adopted a new conflict of interest regulation. While affecting present employees, the regulation is aimed primarily at past employees. It bars them from getting AEC business for the private firms they represent for at least two years after leaving the Commission.

Correction

The headline on page 59, November 6 issue, *Electrical World*, stated erroneously that "one-company" operation of the Iowa utilities had been proposed to "NAEC," the National Association of Electric Companies. Actually, the proposal was made to the utilities themselves by N. Bernard Gussett, Iowa P&L Co.

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Build Good Looks Into 115-Kv Line

(*Continued from page 57*)

undertook the project. The 36/1-strand conductor has a maximum design load of 6,500 lb and an ultimate strength of 30,000 lb.

As this was to be the first run of conductors of this type and size, a trial length was installed at the manufacturer's plant at Chattanooga, Tenn. It handled very satisfactorily, with no undue difficulties because of conductor stiffness or tendency to "swarm." Crews were pleased with the way conductors handled during actual construction. Over-all diameter of the 1,468 MCM ACSR conductors is 1.288 in., in contrast with the 1.457-in. dia of the 1.468 MCM ACSR used in the past. Difference in wind loading under hurricane conditions is appreciable. Other characteristics are a breaking strength of 30,000 lb, and a dc resistance at 20C of 0.01168 ohms per 1,000 ft. It weighs 1,494 lb per 1,000 ft.

Soil conditions along the routes of the two lines were such that foundations 4 ft in dia and 20 ft deep were needed to withstand the design loading of 400,000 ft-lb at the ground line on tangent structures. For guy stubs on dead ends and large angles, foundations 32 ft deep are required.

The first line was built with reinforced concrete foundations poured in 54-in.-dia holes bored mechanically. But soil conditions were so poor that caving of the holes required extensive steel casings, resulting in excessive cost and construction time.

For the second line, 54-in.-dia pre-stressed concrete piling was installed at considerable saving in cost and construction time. Holes were drilled to 12 ft and the 54-in.-dia piling was stood on end in the hole and driven the remainder of the way. Pre-drilling provided a method of holding the piling upright and a means of removing the dirt from the upper section of the piling to allow pouring of the concrete grouting in the steel channel insert assembly for attachment of the aluminum poles.

The piling has an outside diameter is 54 in., and a wall thickness of 4¾ in. The 12 pre-stressed steel cables in the walls provide a workable moment loading of 500,000 ft-lb.

Surveys Sell Street Lighting

(*Continued from page 62*)

The approximate increase in annual operating cost to the towns for Code lighting is figured as the difference between the annual costs of the present and recommended lighting systems. Of course, if there is an installation charge, it should be reported on this table as a separate entry.

Finally, we suggest a relighting plan to the town. A table for this shows what the expenditures would be for various stages of a street light program (Table II). Unless the accident studies dictate otherwise, we recommend relighting the main business and heavy traffic streets first. This usually provides the most good for the most number of people. Next, we recommend relighting the medium traffic streets and then the light traffic streets.

For the last two stages of the relighting program, we recommend relighting the very light traffic streets to half of Code lighting first, then relighting them to full Code. This half Code lighting is only suggested as a logical step toward future full Code lighting for the very light traffic residential streets only.

On a street bearing more than 150 vehicles per maximum night hour, we feel that a municipality would benefit more with full Code lighting on fewer miles of street than to try to illuminate more miles of street to less than Code lighting. But for the very light traffic residential areas, it would not be fair to spend all the street lighting money in one section of town and none in another.

The length of time required to prepare a survey may vary from about 50 man-hours for a small town to 200 man-hours for a city or large town.

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Electric Systems Engineer—Midwestern consulting engineering firm has challenging opportunity in electric systems planning. Work includes network analyzer, sectionalizing and economic feasibility studies. Permanent employment offered to man with 3 to 5 years experience. Submit resume and salary requirements to Stanley Engineering Company, Muscatine, Iowa.

Electrical Engineer with at least six years utility experience to head engineering department of rapidly expanding electric utility. Also graduate electrical engineer, no experience necessary. Excellent opportunity to pioneer on the last frontier. Good schools, city living if desired. Please send resume to Manager, Golden Valley Electric Association, Box 1249, Fairbanks, Alaska.

Chief Electrical Engineer—Electrical engineering and design supervision of steam-electric power plants and substations for consulting firm in large eastern city. Background in planning, economic and system studies desirable. Ability to handle client relations is essential. Age 35-50. Send confidential resume. P-7845, Electrical World.

Electrical Engineer: Small New England utility requires an electrical engineer for distribution design, technical representative to local firms and related requirements. Position will be assistant to present department head. Replies will be handled in confidence. Write stating age, experience and salary expected to P-7834, Electrical World.

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Meetings Calendar

NOVEMBER

American Society of Mechanical Engineers—Annual Meeting, Statler Hilton Hotel, New York City, Nov. 26 Dec. 1.

Edison Electric Institute—Commercial Lighting Committee, Rochester, New York, Nov. 27-28; Electric Space Heating & Air Conditioning Committee, Pittsburgh, Penn., Nov. 30-Dec. 1.

NEMA—Generation, Transmission & Distribution Equipment Division, Shoreham Hotel, Washington, D. C., Nov. 27-29.

Pacific Coast Electrical Association—Administrative Services Section, Hotel Miramar, Santa Barbara, California, Nov. 27-28.

Public Utilities Advertising Association—Region 2 Meeting, Hershey, Penn., Nov. 30-Dec. 1.

DECEMBER

Eastern Joint Computer Conference—Sheraton-Park Hotel, Washington, D. C., Dec. 3-7.

Edison Electric Institute—Residential Electric Heating & Air Conditioning Committee, Chicago, Illinois, Dec. 4-5; Street & Highway Lighting Committee, Tampa, Florida, Dec. 5-7.

Metallurgical Society of the American Institute of Mining, Metallurgical, and Petroleum Engineers—19th Annual Electric Furnace Conference, Penn-Sheraton Hotel, Pittsburgh, Dec. 6-8.

JANUARY—1962

Public Utilities Advertising Association—Region 9 Meeting. Palm Springs, California, Jan. 18-19.

American Society of Mechanical Engineers—Symposium on Thermophysical Properties, Princeton University, Princeton, New Jersey, Jan. 22-26.

Southeastern Electric Exchange—Legal and Claims Committee, Roosevelt Hotel, New Orleans, Louisiana, Jan. 24-25.

American Institute of Electrical Engineers—Winter General Meeting, Statler Hotel, New York City, Jan. 28-Feb. 2.

• **American Management Association**—Session on Industrial Preparedness-Planning for Corporate Continuity and Survival, Astor Hotel, New York City, Jan. 31-Feb. 2.

FEBRUARY

• **National Association of Purchasing Agents**—Public Utility Buyers' Group Meeting, San Francisco, California, Feb. 4-6.

• **American Public Power Association**—Workshop, Peabody Hotel, Memphis, Tenn., Feb. 7-9.

• **National Electrical Week**—Feb. 11-17.

• **Missouri Valley Electric Association**—Industrial & Commercial Sales Conference, President Hotel, Kansas City, Missouri, Feb. 15-16.

• **Pacific Coast Electrical Association**—Business Development Section, Huntington-Sheraton Hotel, Pasadena, California, Feb. 26-27.

• Additions this week.

Electrical Industry Film Previewed in New York

Electrical industry leaders met in New York last week to preview an industry film, "A New Definition of Power," produced by *Life* magazine.

The film, dramatizing the contribution made by electric power to the growth of the nation's economy, is designed to be shown before school and civic club audiences during National Electric Week. It is available from the Appliance Merchandising Manager of *Life* for $9.95.

National Electric Week, to be celebrated February 11 through 17, 1962, will bring together many sectors of the electrical industry for a concerted institutional advertising effort. More than 5,000 copies of the N. E. W. guide for participating companies have been distributed, and over 50 manufacturers and allied industries have indicated plans to take part in the observance. Chairman of the N. E. W. Committee is Harold A. Webster, president of T. Frederick Jackson, Inc.

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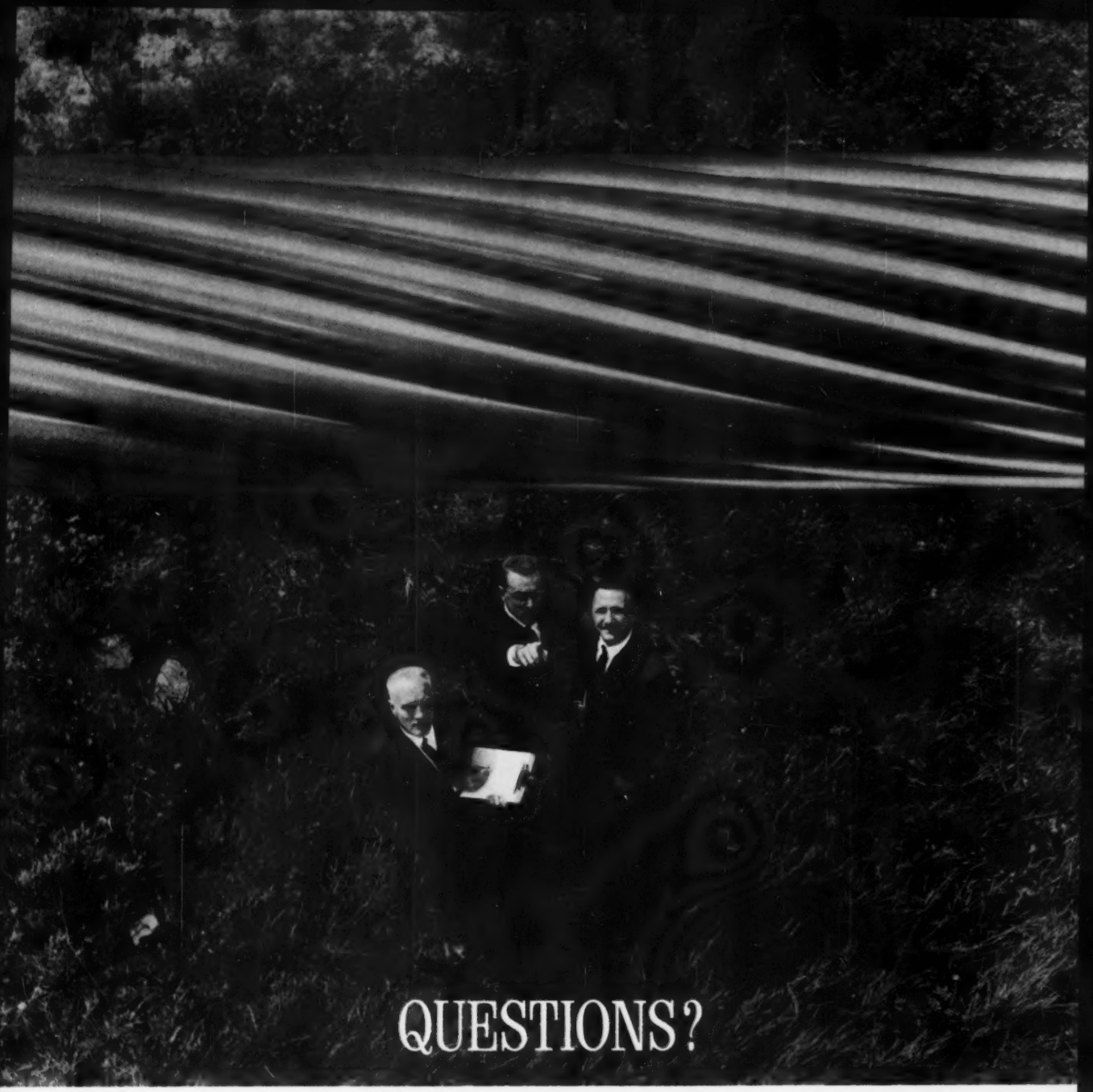

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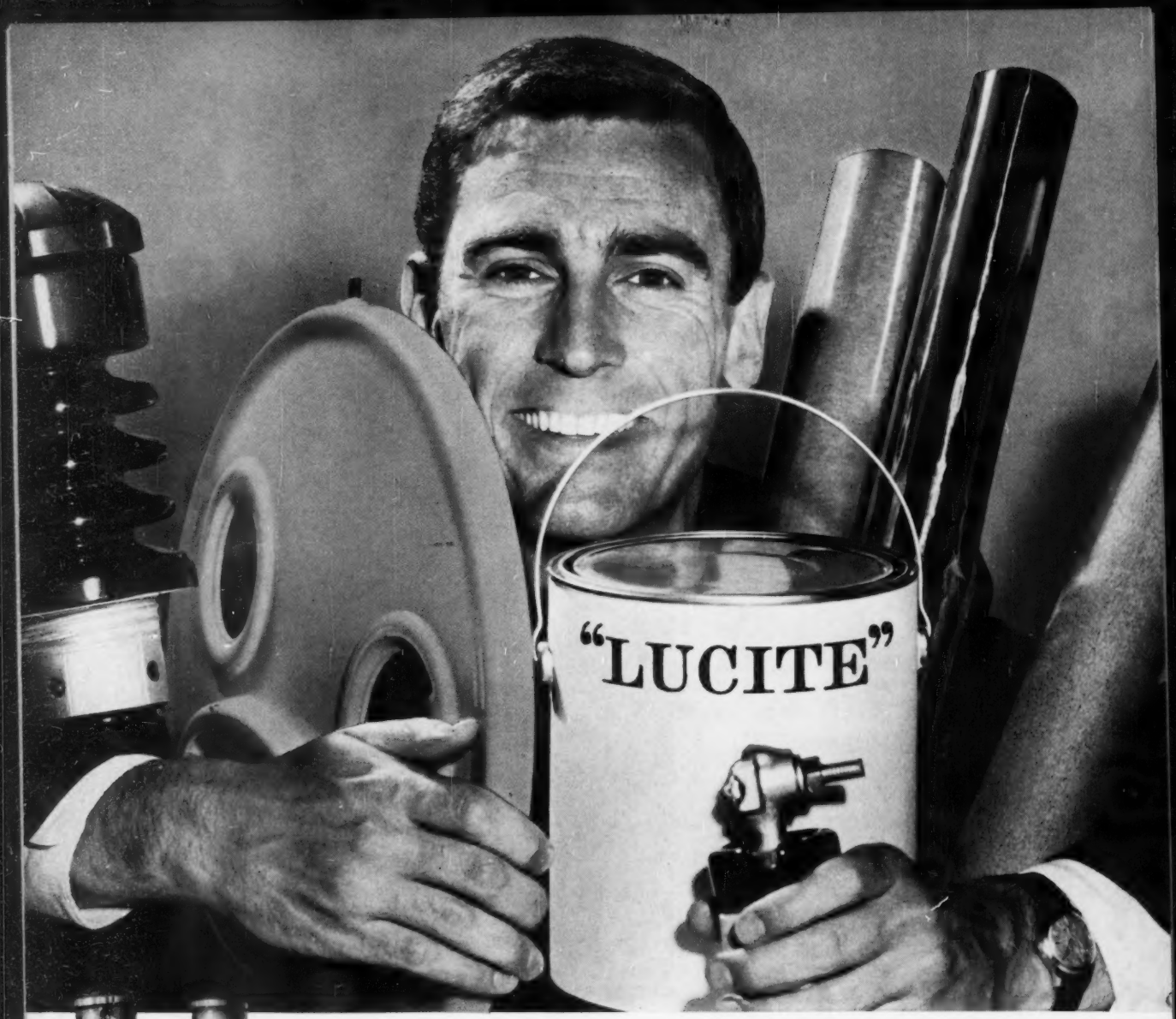

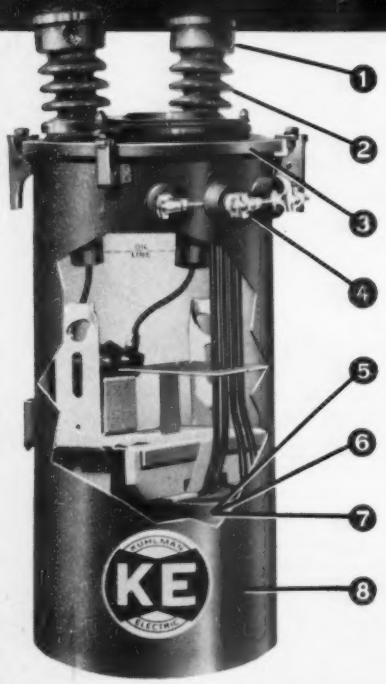

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